Service Manual

DVR-8286W

LENCO 902M

SPECIFICATIONS

SYSTEM

Video signal	: VHS PAL/NTSC/MESECAM Color
Channel coverage	: VHF LOW: E2~E4, X, Y, Z, S1, S2 (8 CH-WIDE BAND) E2~E4, S1~S10, X, Y, Z, Z+1, Z+2 (18 CH-HYPER BAND) VHF HIGH: S3~S10, E5~E12, S11~S20 (26 CH-WIDE BAND) E5~E12, S11~S41 (39CH-HYPER BAND) UHF: E21~E69, C57 (50 CH-WIDE BAND) E21~E69 (49 CH-HYPER BAND)
UHF output signal	: CH 30~39 (adjustable) PRESET 36 CH CH 26~38 (adjustable) PRESET 34 CH-for MYANMAR (NTSC)

VIDEO

Input: Video line in	: Phono type connector (1.0Vp-p) 75 ohms unbalanced/ negative sync.
Output: Video line out	: Phono type connector (1.0Vp-p) 75 ohms unbalanced/negative
Signal to noise ratio	: More than 45dB (SP)
Horizontal resolution	: 240 lines (SP/PAL) 220 LINES (SP/NTSC)

AUDIO

Input: Audio line in	: Phono type connector (47K ohms) -8dBm, unbalanced
Output: Audio line out	: Phono type connector (Less than 1K Ohms) -6dBm (More than 47K ohms load) /unbalanced
Frequency response	: 100Hz~8KHz (SP/PAL) 100Hz~10KHz (SP/NTSC)
Signal to noise ratio	: More than 38dB (SP/PAL) More than 40dB (SP/NTSC)
Audio Distortion	: LESS THAN 3% (SP)

TAPE TRANSPORT

Tape width	: 12.65mm (1/2")
Tape speed	: PAL SP: 23.39mm/s, LP: 11.70 mm/s, NTSC SP: 33.35 mm/s, SLP: 11.12 mm/s
Maximum recording time	: 480min, with E-240 tape (PAL LP) 480 min, with T-160 tape (NTSC SLP)
FF. REW time	: Within 5 minutes (T-120 or E-180)

GENERAL

Power requirements	: AC 90~250V, 50/60Hz
Power consumption	: 17W

DIMENSIONS

Set size (WxHxD)	: 420x88x349 mm
Carton size (WxHxD)	: 510x175x451 mm
Weight	: 5.7Kg

• Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.) See table below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metalic parts. See table below.

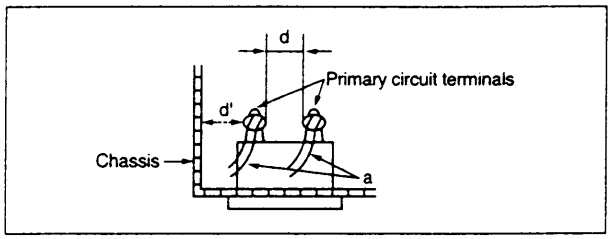

Fig. 1

Table 1: Rating for selected areas

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance (d), (d')
100V	Japan	≥ 1 MΩ/500 V DC	1kV 1 minute	≥ 3 mm
110 to 130V	USA & Canada	---	900V 1 minute	≥ 3.2mm
* 110 to 130 V 200 to 240 V	Europe Australia	≥ 10 MΩ/500 V DC	4 kV 1 minute	≥ 6 mm (d) ≥ 8 mm (d') (a: Power cord)

* Class II model only.

Note: This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

4. Leakage current test

Confirm specified or lower leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.)

Measuring Method: (Power ON)
Insert load Z between B (earth ground, power cord plug prongs) and exposed accesible parts. Use and AC voltmeter to measure across both terminals of load Z. See figure and following table.

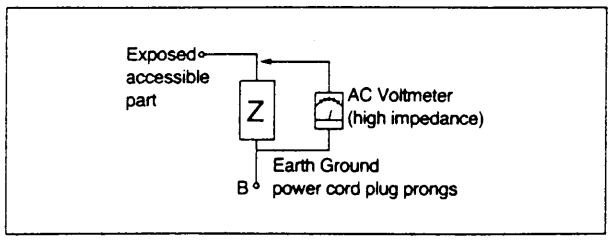

Fig. 2

Table 2: Leakage current ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (B) to:
100V	Japan	1kΩ	i ≤ 1m A rms	Exposed accessible parts
110 to 130 V	USA &	0.5μF, 1.5kΩ	i ≤ 0.5 m A rms	Exposed accessible parts
110 to 130 V 200 to 240 V	Europe Australia	2kΩ	i ≤ 0.7 m A peak i ≤ 2 m A dc	Antenna earth terminals
		50kΩ	i ≤ 0.7 m A peak i ≤ 2 m A dc	Other terminals

Note: This table unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

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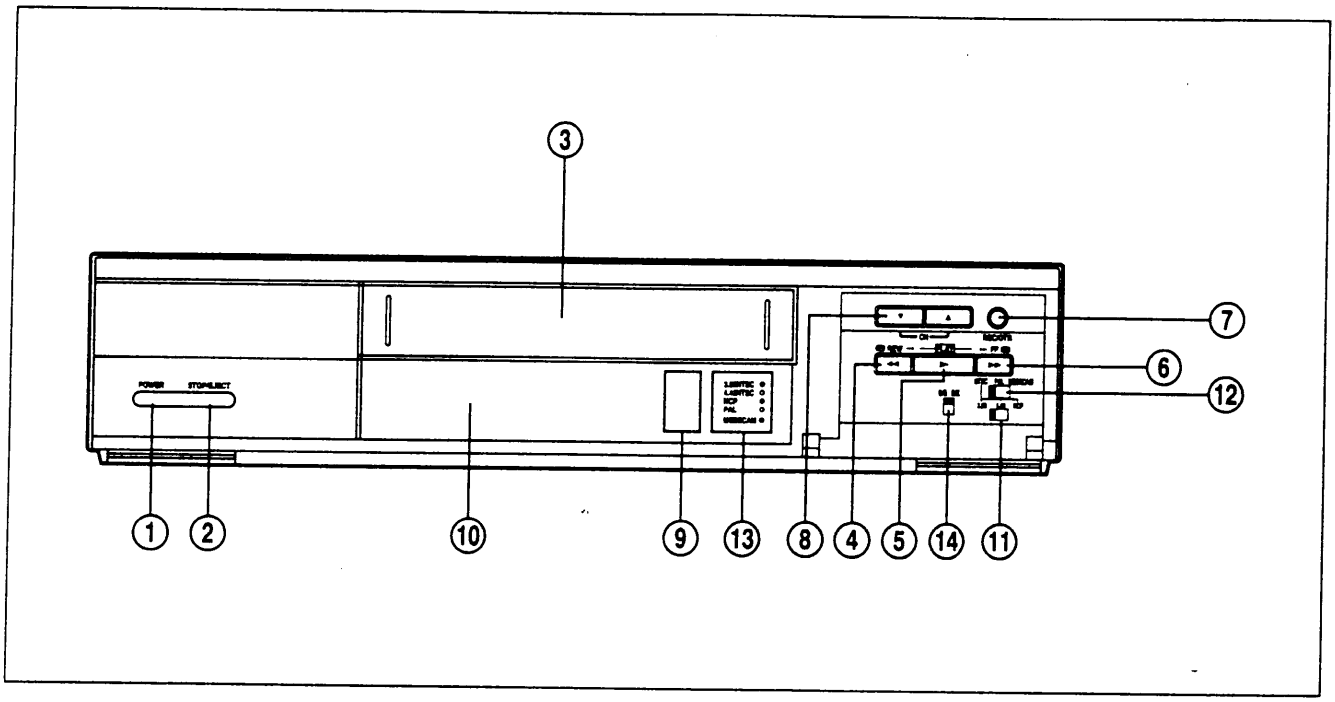
SECTION 1. GENERAL



① **POWER Button**
Turns VCR power on and off.

② **STOP/EJECT Button**
In STOP mode this button makes a cassette come out of compartment. In any other mode except STOP this button operates STOP function.

③ **Cassette Compartment**
When the cassette is inserted in this compartment, the cassette will automatically be ready for operation.

④ **REW/REV Button**
The REW Button serves a dual purpose. Push to rewind the tape. When this button is pushed during the playback mode, the picture will move quickly backward and you can search for the desired part of the program.

⑤ **PLAY Button**
Push to playback the recorded tape.

⑥ **FF/CUE Button**
The FF Button serves a dual purpose. Push to fast forward the tape. When this button is pushed during the playback mode, the picture will move quickly forward and you can search for the desired part of the program.

⑦ **RECORD/OTR Button**
Push this button to record. If the safety tab has been removed from the cassette, it will not be possible to record, thereby preventing your recordings from accidentally erased. Push to input the recording time. Each touch to the button will increase the recording time by 30 minutes for up to 4 hours.

⑧ **Channel selector/Tracking Button**
Push to select the channels you wish to view. But these buttons are used by the tracking control buttons in Play back Mode.

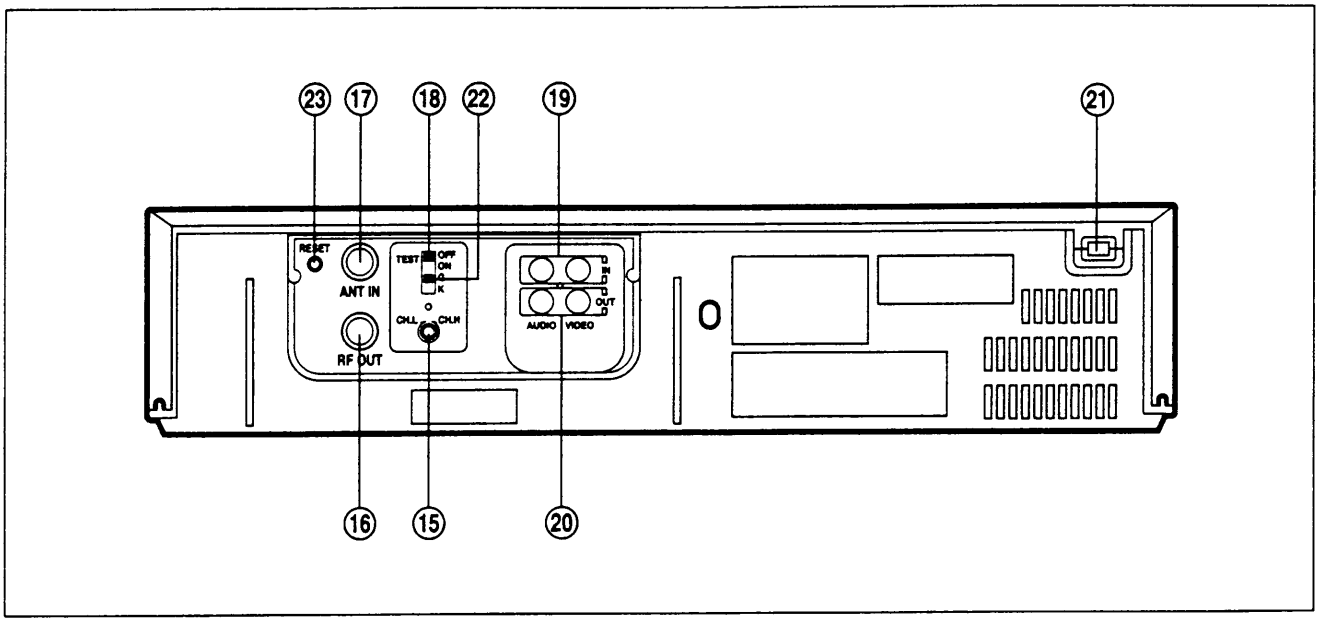
⑨ **Remote Sensor**
Receives signals from the Remote Control.

⑩ **Multi Function Display**
Indicates what function is being operated now.

⑪, ⑫ **VIDEO System Selector Switchs**
Selects the system manually depending on the signals in the playback mode and Recording mode.

⑬ **INDICATOR**
INDICATOR LED is lit up by each system.

⑭ **Receiving TV System Selector Switch**
Selects receiving TV signals by this switch.



⑮ RF OUTPUT CHANNEL ADJUSTMENT SCREW
In video playback mode, you can adjust more accutately the RF OUT for obtaining clean picture.

⑯ RF OUT Terminal
Connect this terminal to your television antenna terminal, using the accessories provided.

⑰ ANTENNA IN Terminal
Connect a TV aerial to this terminal.

⑱ TEST SIGNAL Switch
In test signal mode, you can check channel accordance of the TV and VCR.

⑲ A/V IN JACK Terminal
Connect a phone jack of TV or VCR to this terminal.

⑳ A/V OUT JACK Terminal
Connect a phone jack of TV or VCR to this terminal.

㉑ POWER CORD
Connect this cord into the AC output.

㉒ RF OUTPUT Selector Switch
Selects the modulator RF output signal.
In MYANMAR, this output system will change to "M", "G".

㉓ RESET

SECTION 2. ELECTRICAL ADJUSTMENTS

2-1. ALIGNMENT AND ELECTRICAL ADJUSTMENT

For these adjustments, use the equipments mentioned below and proceed by using the alignment tape and video signal.

Instrument and Tools Required

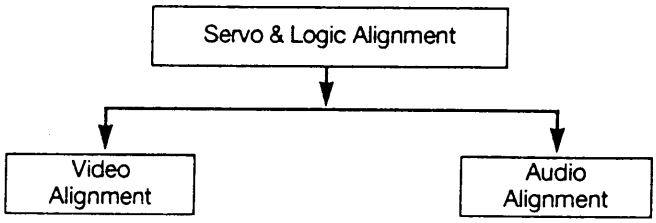
1. Color TV receiver.
2. Oscilloscope having 10 MHz or more bandwidth.
3. Color-bar generator.
4. Frequency counter.
5. DVM.
6. AC Voltmeter
7. Audio oscillator.
8. Audio attenuator.
9. Alignment TAPE.
10. Recording TAPE.

Signal Level and Input and Output Impedance Requirement

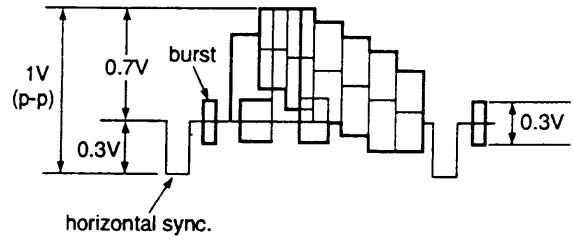
1. Video output: Negative sync, 1Vp-p standard composite video signal, 75Ω.
2. Video output: Same as above.
3. Audio input: Line -8dBm 47KΩ unbalanced.
4. Audio output: -6dBm less than 1KΩ unbalanced.

Adjustment Sequence

The VCR should be adjusted in the sequence shown below.



The suitable output waveform of the color-bar signal generator is shown below.



color bar signal waveform

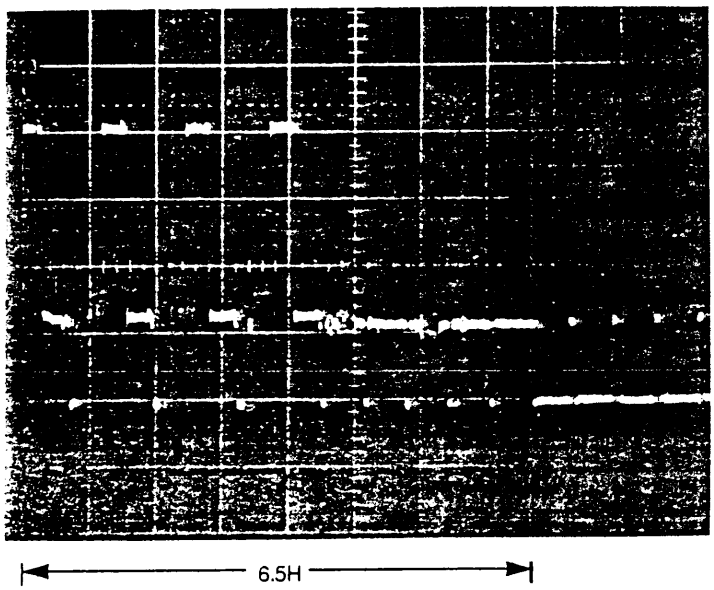
75% White	Yellow	Cyan	Green	Magenta	Red	Blue
Q	I	100% WHITE			BLACK	

2-2. SERVO-LOGIC CIRCUIT ADJUSTMENT METHOD

1. VIDEO HEAD SWITCHING POSITION

Adj. Location	Checking Point	Measuring Equipment	Mode	Test Tape
R595	PT01 ③ PIN TP396	Oscilloscope	Play	DP-1 Color Bar

1) Play back the test tape.
2) Set the oscilloscope in the chop mode to connect the CH1 to SW pulse (PT01 ③), the CH2 to TP396 (video out) . And then trigger the scope with the signal from the CH1.
3) Adjust R595 for the positive trigger until 6.5±0.5H cycles before the vertical SYNC pulse.

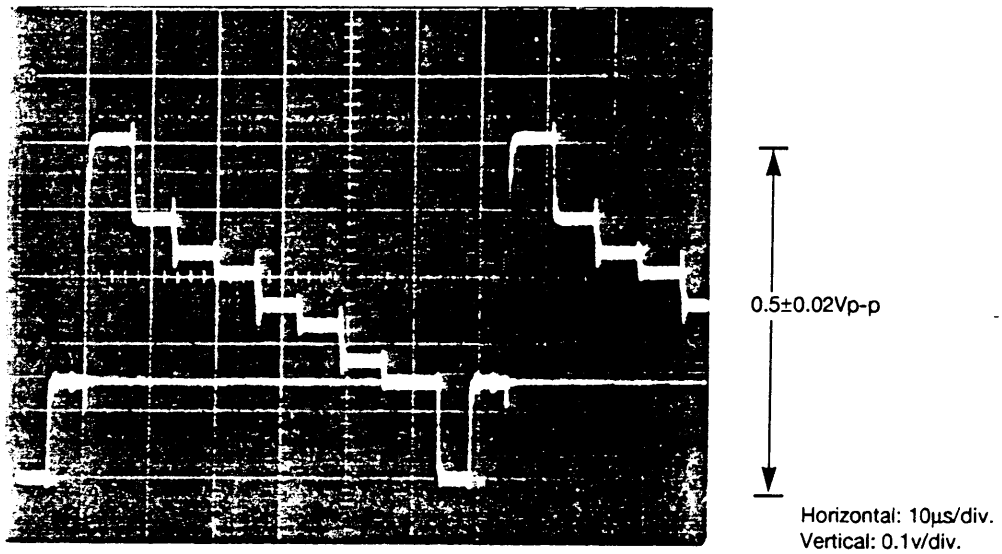


2-3. VIDEO CIRCUIT ADJUSTMENT METHOD

1. EE VIDEO LEVEL

Adj. Location	Checking Point	Measuring Equipment	Mode	Test Tape
R395	TP395	Oscilloscope	EE	-

1) Set the TV/LINE to LINE mode.
2) Supply the color bar signal to the line input terminal. And set for the stop (EE) mode.
3) Connect the oscilloscope to TP395 and trigger the scope with a composite SYNC signal at TP313 (COMP. SYNC).
4) Adjust the oscilloscope in order that it can display a waveform of approx 2H.
5) Adjust R395 to obtain 0.5±0.02 Vp-p between SYNC TIP and 100% white level.



2. SYNC TIP FREQUENCY

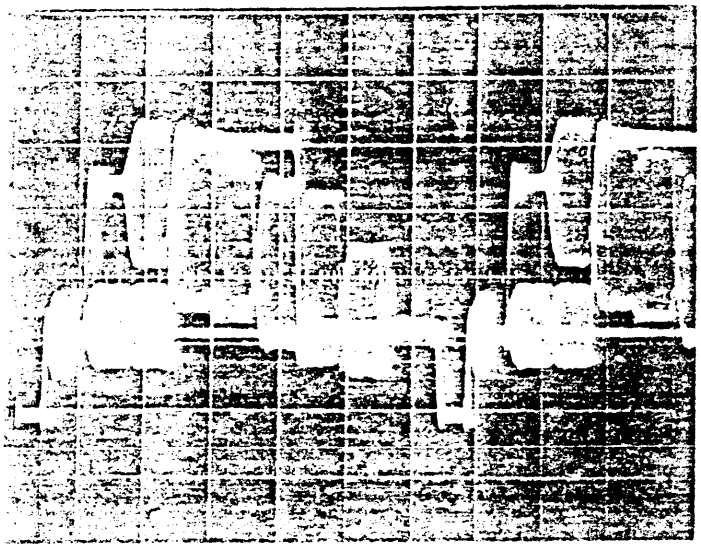
Adj. Location	Checking Point	Measuring Equipment	Mode	Test Tape
R391	TP391	Freq. Counter	REC	Blank Tape

1) Set the unit to REC mode without video signal. (at Line mode)
2) Connect the frequency counter to TP391.
3) Adjust R391 until the SYNC TIP frequency becomes 3.73 MHz±0.03 MHz.

3. PLAYBACK Y-SIGNAL OUTPUT LEVEL

Adj. Location	Checking Point	Measuring Equipment	Mode	Test Tape
R396	TP396	Oscilloscope	PB	DP-1 (Color Bar)

1) Playback the test tape (Color Bar Signal).
2) Connect the oscilloscope to TP392 and trigger the scope with a composite SYNC signal at TP313.
   Adjust the scope so that it can display a waveform of approx. 2H.
3) Adjust R396 to obtain 2.0±0.1 Vp-p between the SYNC TIP and 100% white level.



2-4. PIF CIRCUIT ADJUSTMENT METHOD

1. PIF COIL Adjustment

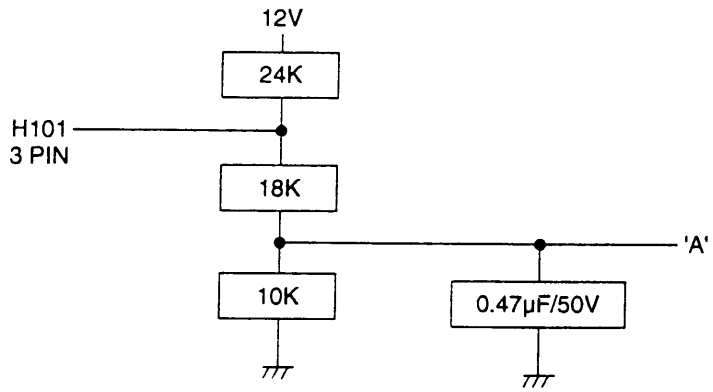
Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Input Signal
L109	H101 6 PIN	Oscilloscope Signal Generator	Separated IF module PCB	• FC: 38.0 MHz • Modulation Factor: No Modulation • Input Level: 80dBμV (75Ω Loaded)

1) Connect 12V DC to Pin No. 7 and GND to Pin No. 8 of H101.
2) Connect the signal generator output to Pin No. 9 and GND to Pin No. 8 of H101.
3) Connect the oscilloscope probe to the measuring point and GND.
4. Adjust PIF coil to obtain minimum DC Voltage.

2. AFT COIL Adjustment

Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Input Signal
L110	'A'	Signal Generator Oscilloscope	Separated IF module PCB	• FC: 38.0 MHz • Modulation Factor: 30%, fm=15.625KHz • Input Level: 80dBμV (75Ω Loaded)

1) Connect an enclosed circuit to H101 Pin No. 3 by following.



2) Connect 12V DC to Pin NO. 7 and GND to Pin No. 8 of H101.
3) Connect the Signal Generator output to Pin No. 9 and GND to Pin No. 8 of H101.
4) Connect the oscilloscope prohe to the measuring point and GND.
5) Adjust AFT coil to obtain 2.3±0.15V DC at the point DC voltage changes suddenly.

3. RF AGC VR Adjustment

Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Input Signal
R191	H101 2 Pin	Signal Generator Oscilloscope	Separated IF module PCB	• FC: 38.0 MHz • Modulation Factor: 30%, fm=15.625KHz • Input Level: 92dBμV (75Ω Loaded)

1) Connect 12V DC to Pin No. 7 and GND to Pin No. 8 of H101.
2) Connect the signal generator output to Pin No. 9 and GND to pin NO. 8 of H101.
3) Connect the oscilloscope probe to the measuring point and GND.
4) Adjust RF AGC VR to obtain 6.0±0.2V DC.

2-5. AUDIO CIRCUIT ADJUSTMENT METHOD

1. PLAYBACK CIRCUIT ADJUSTMENT METHOD

Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Test Tape
R291	Audio Line Out	Audio Level Meter	Play Mode	DP-1

1) Connect the audio level meter to the audio output jack.
2) Playback the test tape.
3) Adjust R291 until the audio level meter reads -6±1.5 dBm playback output.

2. PLAY BACK OUTPUT FREQUENCY CHARACTERISTIC

Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Test Tape
Checking	Audio Line Out	Audio Level Meter	Play Mode	DP-1 DP-2

1) Playback the Test tape, and confirm that the playback output level at 6 KHz is within -1±3 dB as referenced to the 1 KHz playback output level.

3. BIAS CURRENT ADJUSTMENT AND OSCILLATION FREQUENCY CHECKING

Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Test Tape
R292	TP201 (+), TP202 (-)	Frequency Counter AC Voltmeter	REC. Mode	Blank Tape

1) Connect the positive lead of the AC Voltmeter to TP201 and negative lead to TP202.
2) Set the VCR to REC mode without audio signal at line mode.
3) Confirm the frequency counter display is 70 KHz±10% and adjust R292 AC Voltmeter reads 2.4mVrms.

4. RECORD-PLAYBACK FREQUENCY RESPONSE

Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Test Tape
Checking	Audio Line Out	Audio Level Meter Audio Signal Generator	REC. Play Mode	Blank Tape

1) Press the TV/LINE button to select line mode.
2) Connect the audio signal generator to the audio line input and the audio level meter to the audio line output of Phono Jack.
3) Record reference audio signal of the 400 Hz, 8 KHz (SP) at -20 dBm in PAL mode.
4) Check to insure that 8 KHz playback output level is within -1±3dB as referenced to the 400Hz playback output level.
5) If the difference between 8 KHz playback output level and 400 Hz is more than +2 dB, increase the bias current more than 2.4 mVms, and if the difference is less than -4 dBm reduce the bias current less than 2.4 mVrms.

5. RECORD-PLAYBACK OUTPUT LEVEL

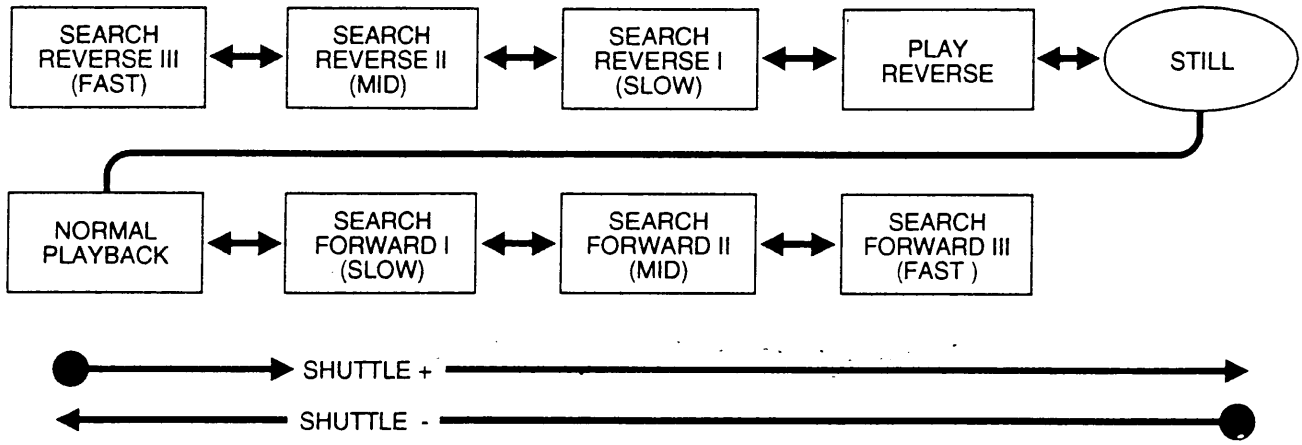
Adj. Location	Measuring Point	Measuring Equipment	Condition of Adj.	Test Tape
Checking	Audio Line Out	Audio Level Meter Audio Signal Generator	REC. Play Mode	Blank Tape

1) Press the TV/LINE button to select line mode.
2) Connect the audio signal generator to the audio line input and audio level meter to the audio line output of Phono Jack.
3) Record and playback the input of the audio reference signal 1 KHz, -8 dBm.
4) Confirm that play output level is -6±3 dBm, (SP) ±3 dB (LP).

SECTION 3. SPECIAL FEATURE

3-1. DIGITAL SHUTTLE FUNCTION (ONLY OPERABLE WITH REMOTE CONTROL)

DIGITAL SHUTTLE allows you to control speeds variously in playback mode.



- Speed is accelerated by pressing SHUTTLE + or SHUTTLE – key once every time.
- Every time pressing SHUTTLE + key once at STILL mode, the speed will vary from:

NORMAL PLAYBACK ➡ SEARCH FORWARD I (SLOW) ➡ SEARCH FORWARD II (MID)

➡ SEARCH FORWARD III (FAST)

- Every time pressing SHUTTLE – key once every time at STILL mode, the speed will vary from:

REVERSE NORMAL PLAYBACK ➡ REVERSE SEARCH I (SLOW) ➡ REVERSE SEARCH II (MID)

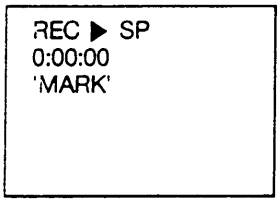
➡ REVERSE SEARCH III (FAST)

3-2. VISS (VHS INDEX SEARCH SYSTEM)

INDEX MARK REGISTER

AUTO REGISTER

- When recording starts in normal recording and OTR as well as timer recording, INDEX MARK is automatically registered on video cassette tape.



- For 3 seconds 'MARK' will be displayed on TV screen.
- 'MARK' does not appear in OTR mode.

Please Note:

1. Index Mark cannot be registered on a cassette without safety tab.
2. A program must be recorded for more than 5 minutes at least to operate VISS.
3. A cassette tape must be fast forwarded for a few seconds when recording from the beginning of cassette tape.
   *The beginning of a cassette tape film is made of transparent tape. Recording and index marking cannot be done on this part due to absence of magnectic coating.

Please Note:

OSD (on-screen-display) screen will disappear within a few seconds in INDEX SEARCH mode and INDEX SKIP mode. To resume OSD (on-screen-display) screen, press OSD RECALL key, pressing once more will erase OSD.

INDEX SEARCH (ONLY OPERABLE WITH REMOTE CONTROL)

① Index Search (Start)

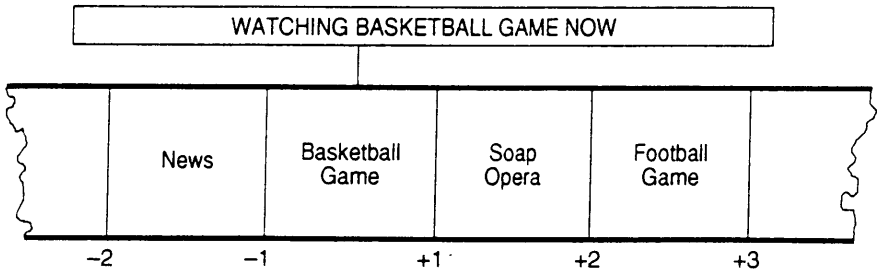
1. Press MENU key and select No. 4 (FUNCTION) on the remote control.
2. And select No. 1 (INDEX SEARCH).
   - A cassette will be rewound to the beginning.

② Index Search (Play)

- The INDEX FUNCTIOn will automatically search (The VCR will play for the first 6 seconds at every index marked segement and will search again. This process will be repeated at every index marked segement to the end of a cassette).
- To interrupt while playing for 6 seconds to watch, press play key.

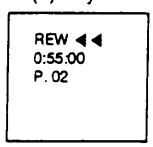
INDEX

- INDEX SKIP function allows you to locate a specific index marked part. Use INDEX +, INDEX – keys to skip and locate.



① Index Skip

- Press INDEX (+) key twice.

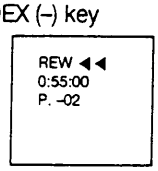


② Play Back

- VCR will fast forward and play from the beginning of the football game.

③ Index Skip

- Press INDEX (–) key twice.



④ Play Back

- VCR will rewind and play from the beginning of the news.

3-3. FULL LOADING SYSTEM (QUICK START)

The operation of VCR starts within 0.8~1 second after pressing any key.
This function allows you to operate VCR 3 times faster than other VCR's without quick start function.

3-4. DIGITAL AUTO TRACKING

You can always play back the best picture without manual tracking because this function allows the VCR Head and the track of tape to accord exactly by automatic sensing of the track signal marked on the video tape.

SECTION 4. CIRCUIT OPERATION

4-1. SERVO SYSTEM (DVR-8286W)

1. General Outline

Servo 1 CHIP (80 pin) IC used in DVR-8286W deals with the functions of exclusive Servo IC and Syscon IC which have been used up to now, combining their functions, by software.
Because this 1 CHIP IC has not ANALOG AMP inside, every output signal from MOTOR should be input through special amplification and waveform shaping (sine waveform-square waveform).

* Salient Features
  - Drum & Capstan Motor soft control.
  - Head sw pulse generation for rotating Heads (Video and Audio heads).
  - QV SYNC signal generation during special operaing (playback) mode.
  - Separation of V-SYNC signal from the C-SYNC signal.
  - Digital auto Tracking soft management.
  - REC CTL Signal generation (Recording mode).
  - INDEX SEARCH Control (VISS).
  - Various speed SLOW mode.
  - Various speed CUE & REV mode.
  - Auto play.

2. Servo System Organization

In VTRS Servo System consists of two control systems: Rotating HEAD DRUM and CAPSTAN MOTOR to make tapes run at regular speed.
The bolck diagram of VTR SERVO SYSTEM is shown in Fig (1). Now, we will examine the Capstan and Drum controls by Software Digital SERVO.
This servo control consists of both of the speed control and the phase control and controls them by using ERROR q'ty corresponding to a mark.
In the speed control, FG signal cycle is the Reference when the motors rotate normally and really motors output the FG signal. In the phase control, FG signal cycle is generated inside u-COM if being not input from outside.
Phase error is timing difference in the PG signal output from Motors and phase reference signal and it is indicated as (Table 1) shows the signal used in the phase control.

(Table 1) Phase Servo Signals

		PHASE	REFERENCE
DURM	Recording	Drum PG signal	V-SYNC
	Playback	Drum PG signal	Reference signal generating in the super Timer unit
CAPSTAN	Recording	PULSE dividing the CAPSTAN FG signal	V-SYNC
	Playback	PG CTL signal	Reference sygnal generating in the super Timer unit

*** Note:**
FG Signal: Frequency Generator signal. Used in motor speed detection.
PG Signal: Phase Generator signal. Used in motor phase detection.

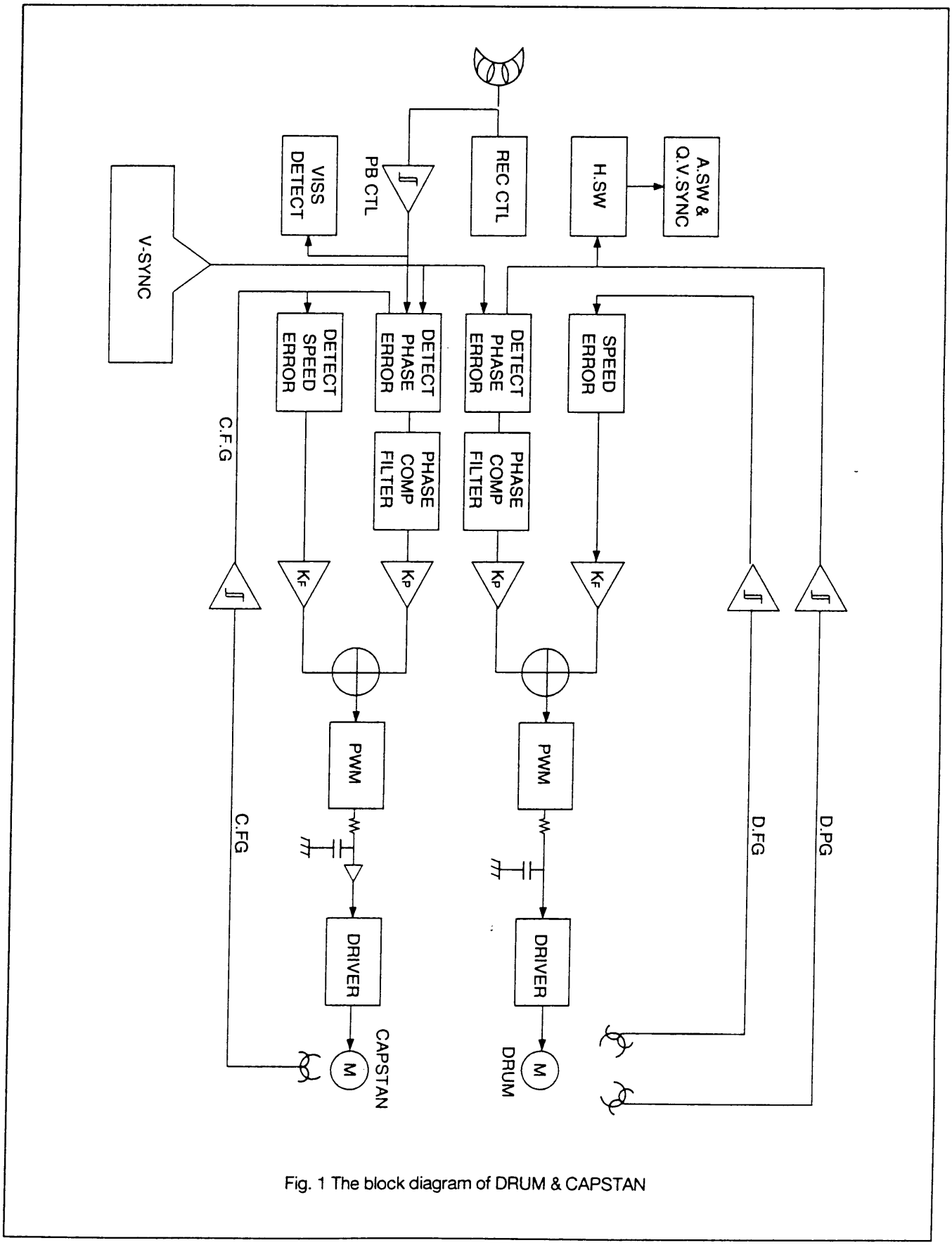


Fig. 1 The block diagram of DRUM & CAPSTAN

3. Drum Servo Operation

Drum servo functions to control the DRUM motor mainly and set the drive cycle during SLOW and make, SW PULSE, Q.V. SYNC, and AFM SW PULSE.

D.FG and D.PG signals output in DRUM MOTOR are used as comparison signal of phase and speed.

The block diagram of DRUM is as follows.

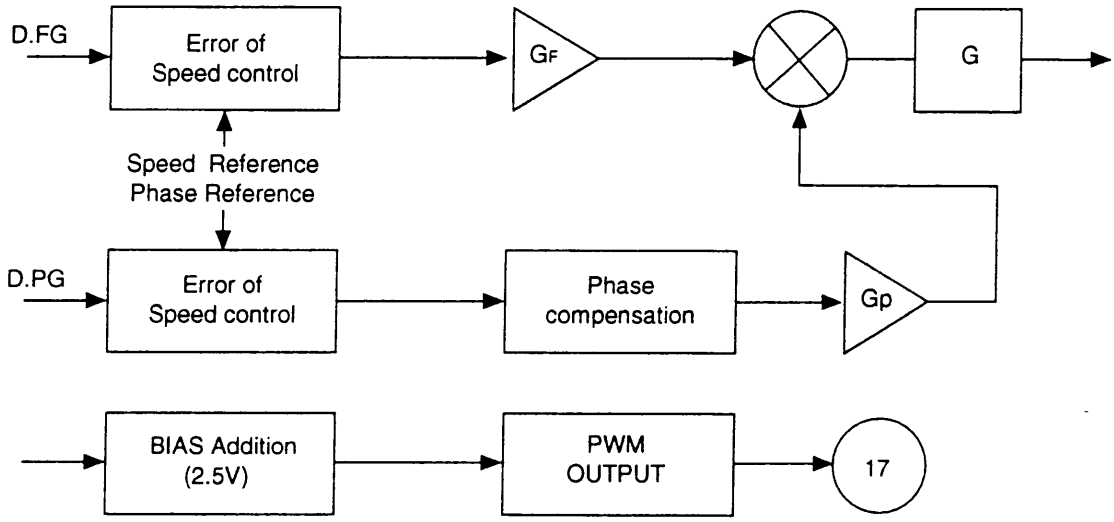


Fig. 2

Drum and capstan Controls basically consist of SPEED and PHASE system servo control, by combining each error q'ty of them.

In the phase control, phase reference signals are made arbitrary pulse of about 25Hz is obtained inside during the play-back.

In the REC mode, reference signals synchronized V.SYNC.

Calculate the difference of the rising edges of the feed back signal of D.PG and Reference signal made in IC and stabilize the phase loop by passing the ERROR through the digital filter, the phase compensation filter. And then output it on the phase control routine, multiplying by GAIN Kp.

DRUM motor drives by Combining the phase error output in the phase routine and speed error.

Because GAIN doesn't change variously in the DRUM system, special power amplification from outside is not required.

D.PG signal is used as producing the SW PULSE for Video HEAD SW.

The shaping circuit of D.PG signal is shown below.

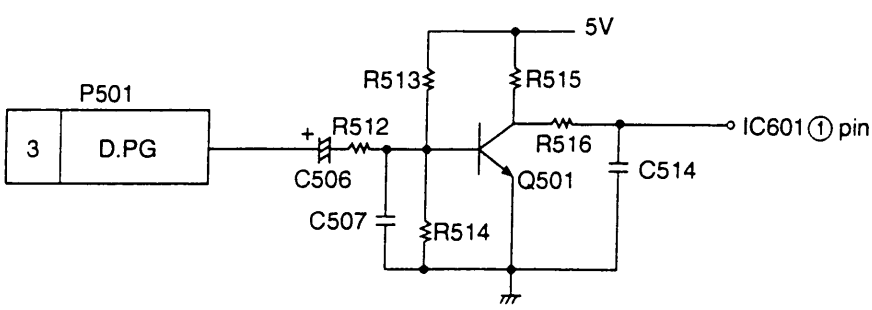


Fig. 3

Regarding D.PG signal, in Fig (3) goes through C506 and after amplificed by Q501; It is input into pin no. 1 of IC601.
Speed control system controls the speed by comparing the Reference set inside and D.FG signal when Motor rotates.
Method and waveform Shaping circuit for Speed control are as follows.
D.FG signal in Fig (4) goes through C510 and after 1.5Vp-p is input to pin no 6 of OPAMP, it is Schmitte trigger by R521 and R520 and becomes waveform shaping.

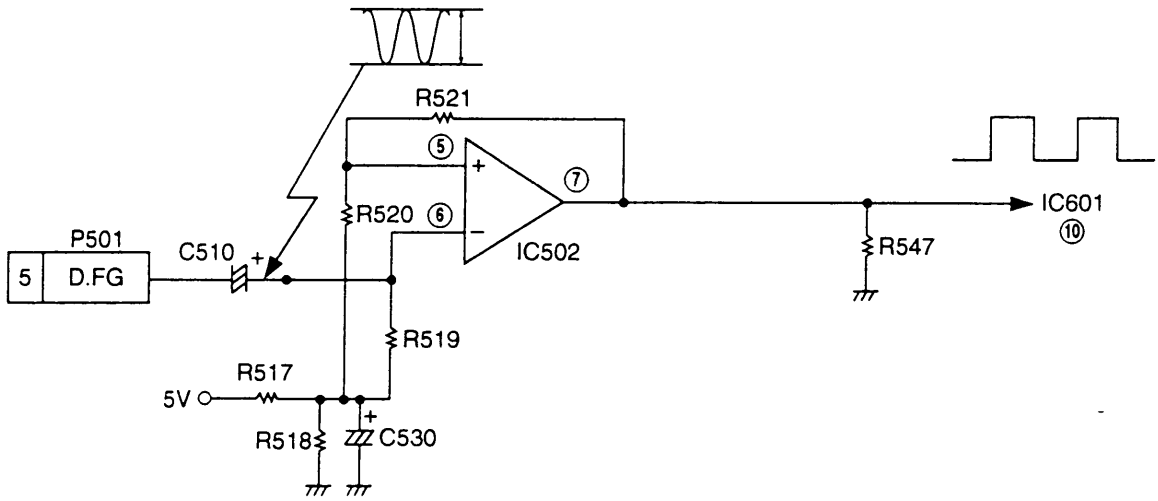


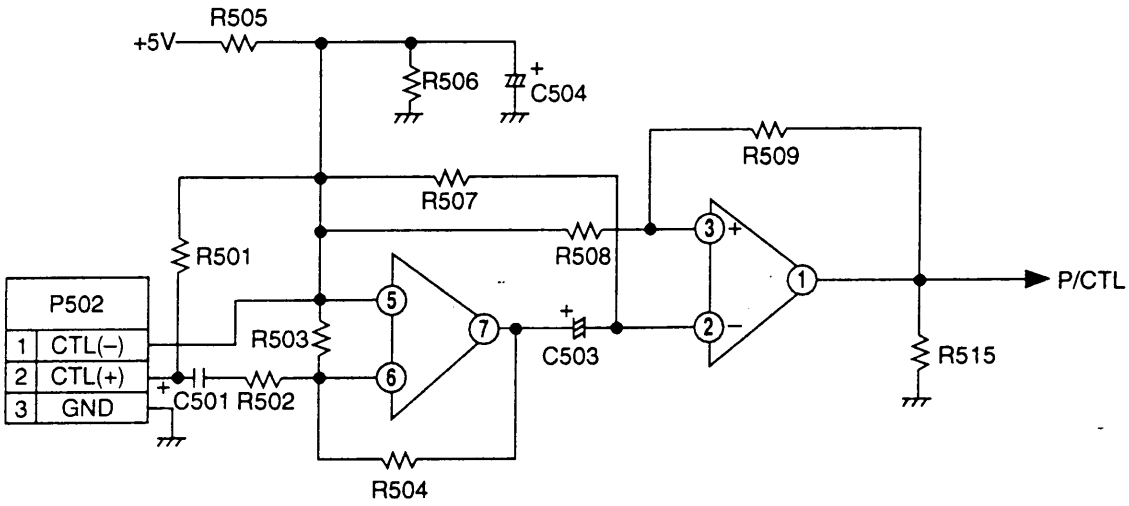
Fig. 4

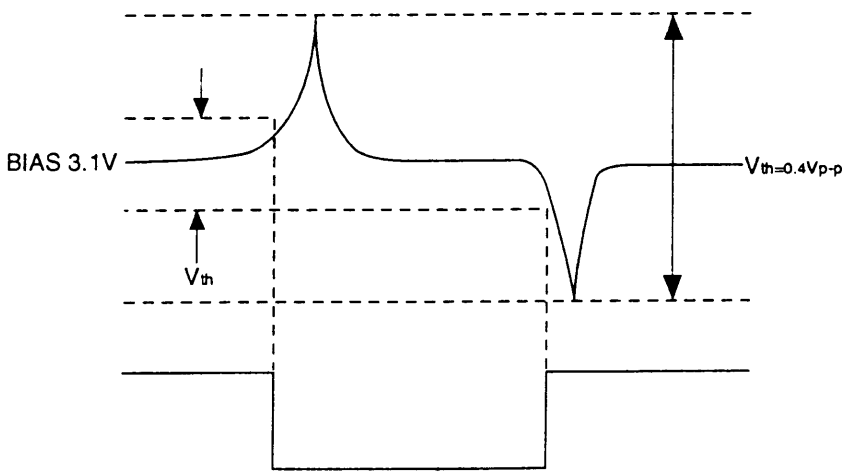
Waveform shaped D.FG controls the speed by comparting the reference with the difference value to subtract the current cycle value from the previous D.FG cycle value.
When the D.FG cycle rotates normally, that is in case it is wider than a target current Drum speed is slow and (+) mark is selected. (Rotate the DRUM fast)
In case the D.FG cycle is narrower than the target, current speed is fast and (–) mark is selected. (Rotate DRUM slowly)

4. Capstan Servo Operation

Capstan Servo has functions of viss detection, REC CTL PULSE generation and REC CTL DUTY adjustment variously during VISS, including the function to control the capstan motor.

Capstan speed control has same block in every mode and phase control has different block in each mode of REC and PB. Capstan control also consists of phase and speed system as DRUM control. Capstan phase control is to maintain the phase relationships between PB CTL signal and VIDEO SW/P regularly. PB CTL signal production process and phase control method are as follows.





CTL signal input via C501 at CTL HEAD is amplified 4000 times by R502 and R504.

And the then it makes PB CTL PULSE of 0.4Vp-p SCHIMITTE with through R509 and it is input to pin no 11 of IC601.

Error is generated as comparing the PB CTL signal input to pin 11 of IC601 to the reference signal for CAPSTAN.

After the ERROR value is multiplied by appropriate phae LOOP GAIN Kp in each mode and after it passes the phase compensation filter for stabilization of phase loop, it is added to capstan speed error. Because this value has various gain in each mode, it drives the Motor by amplifying POWER externally.

Capstan speed control measures the cycle of C.FG which is shaped waveform, outputting from CAPSTAN MOTOR inside of IC and compares it with reference.

Waveform shaping circuit of C.FG and speed control are as follows.

4-2. VIDEO SYSTEM

1. Y-REC mode

Here, it describes the signal flow for the luminance system on the REC mode.
The recording video signal is inputted to the AGC amplified through Pin 37, and sync signal level is controlled to be

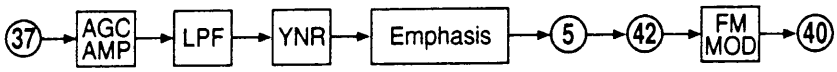


Fig. 1 The signal flow on the REC mode

constant.
The chrominance component in the AGC amp, output is filtered out by a LPF and the luminance signal is fed to the YNR circuit. In the circuit, it is provided a vertical enhancing for the luminance signal.
For the next, high frequency component of the output signal from the YNR circuit is enhanced by the emphasis circuits (consists of Detail Enhancer, Non-linear Emphasis, and Main Emphasis.), and its output is given from Pin 5.
This signal is fed to the FM modulator through pin 42, and the recording Y-FM signal is obtained from Pin 40.

2. Y-PB mode

The play back Y-FM signal is fed to Pin 39.

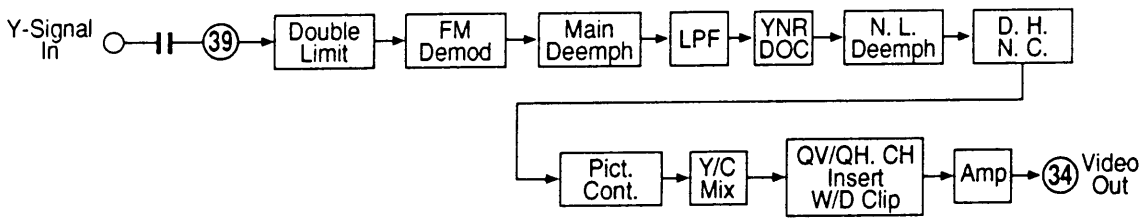


Fig. 2 The signal flow of the Luminance signal on the PB mode

This signal is passed through the Double Limiter and demodulated to video signal by the Frequency Demodulator.
The Frequency Demodulator output is fed to the YNR circuit block through the Main deemphasis and the LPF.
The circuit including the external CCD (1H delay line) is composed of both functions of the YNR and the drop out compensation.
The YNR output is fed to the Y/C Mix circuit through the Non-linear de-emphasis, the Double high pass noise canceler and the Picture control circuit, and then the signal is mixed with the PB chrominance signal and a PB video signal is obtained from Pin 34 through the Quasi-V/H insertion circuit, the Character insertion circuit and the Video output amplifier.

3. PAL color REC mode

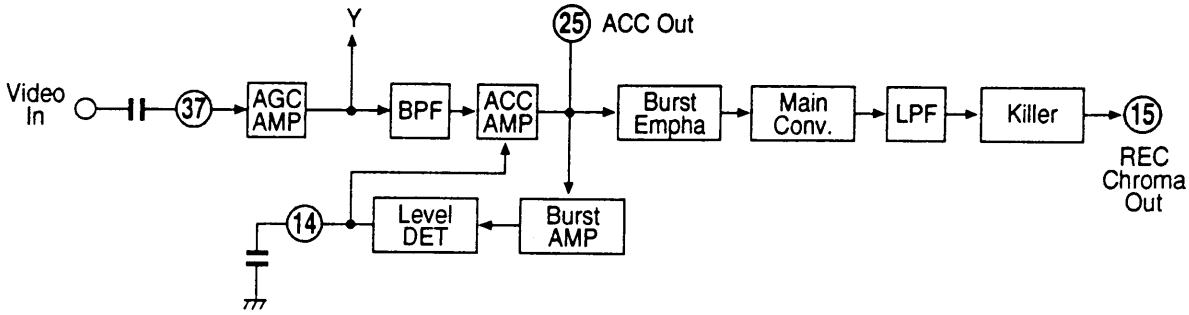


Fig. 3 The flow chart of the chrominance signal on the REC mode

The flow chart of chrominance signal on the REC mode is shown in Fig. 3.
A recording composite video signal is fed to the AGC circuit from Pin 37, and one of its output signal is passed through a BPF (fsc: 4.43Mhz) to extract chrominance components from it, then only the chrominance signal is fed to the ACC amplifier. The gain of ACC amp. is controlled with the DC voltage at Pin 14. The output from ACC amp, is obtained from Pin 25 which can be used for a PAL/SECAM detection, while it is fed to the main converter through the burst emphasis (up) circuit.
Also the other cutput from ACC amp, is fed to the level detector (ACC DET.) through the burst gate amplifier. The output is smoothed by the external filtering capacitor connected to Pin 14 and the signal is fed back to the ACC amplifier in order to control the burst level of ACC amp. constant.
Accordingly, the signal level of burst which is passed through the Burst emphasis circuit and the Main converer circuit is controlled Burst emphasis circuit and the Main converter circuit is controlled constant, and the REC chroma, Signal is stabilized even if a level of input video signal is fluctuated.
The output from Main converter is fed to the Killer circuit through the LPF.
The Killer detector can give a reliable operation thanks to the application of both systems of the Synchronized detection (APC killer) and the Peak detection (ACC killer) on the REC mode.
The signal through the killer circuit is obtained from Pin 15 as a REC chroma, output.

4. PAL color PB mode

The down-converted chroma signal on the PB mode (PAL: 627kHz) is inputted at Pin 15 through an external chroma LPF.

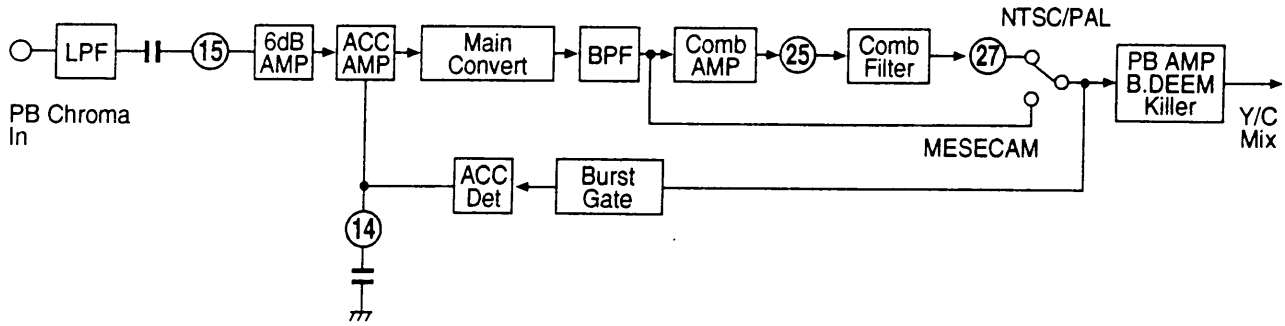


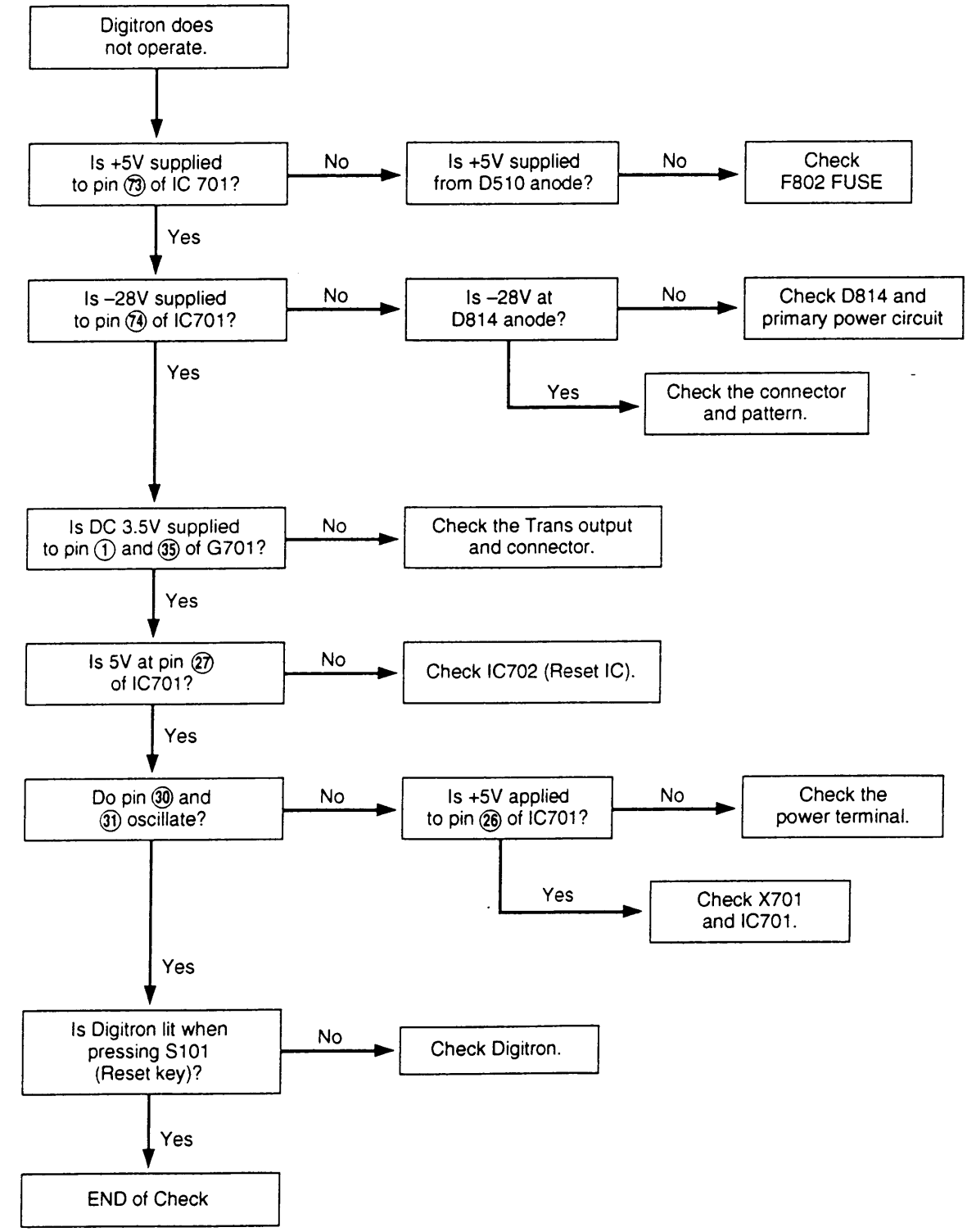
Fig. 4 The flow chart of the chrominance signal on the PB mode

The input signal at Pin 15 is fed to the Main converter through the ACC amplifier. And the output from the Main converter is obtained from Pin 25 through the BPF and the Comb amplifier. After filtering out crosstalk components by an external comb filter, the signal is inputtd again at Pin 27, and this signal is fed to the Y/C mixer through the 6 dB amplifier, the BPF, the PB amplifier, the Burst de-emphasis (down) and the Killer circuit.
However, in case of MESECAM mode, the Main converter output through the BPF is fed to the PB amplifier by bypassing the Comb amplifier and the Comb filter. In addition, the Killer circuit is switched off on the MESECAM mode.

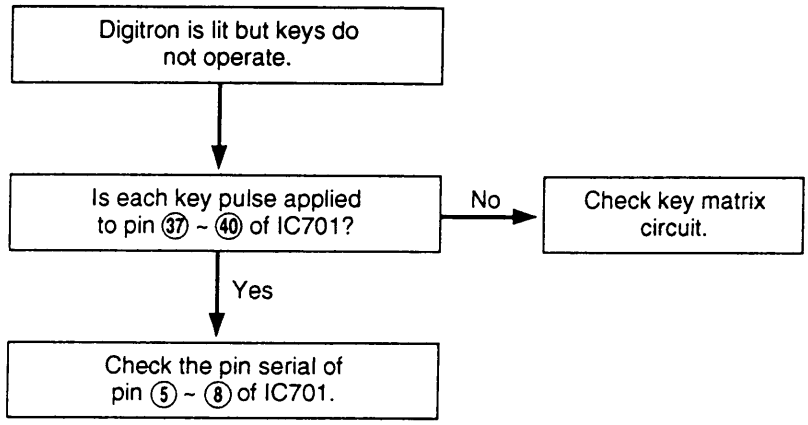
SECTION 5. TROUBLE SHOOTING FLOW CHART

5-1. TIMER CIRCUIT

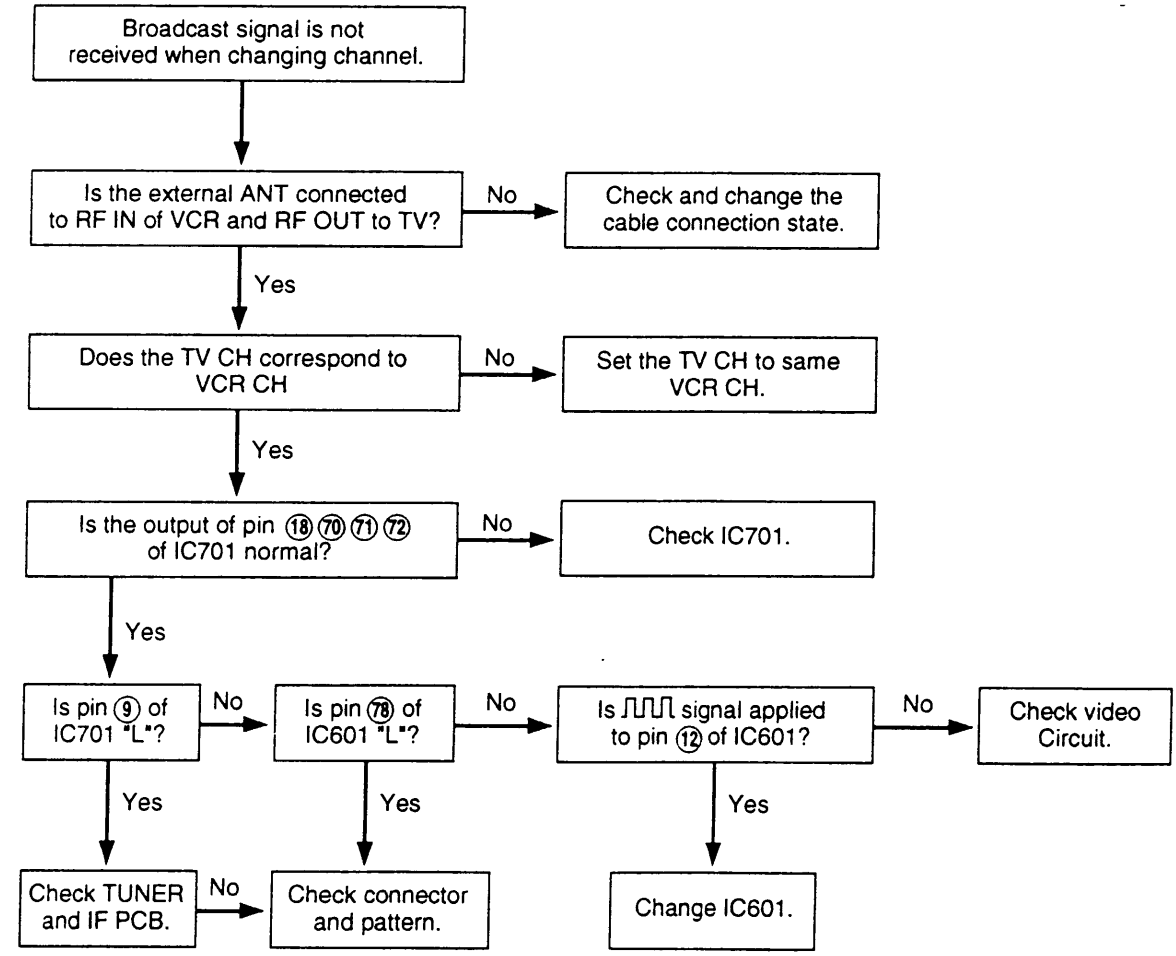
A.



B.


Digitron is lit but keys do not operate.
Is each key pulse applied to pin ㊲ ~ ㊵ of IC701?
No
Check key matrix circuit.
Yes
Check the pin serial of pin ⑤ ~ ⑧ of IC701.

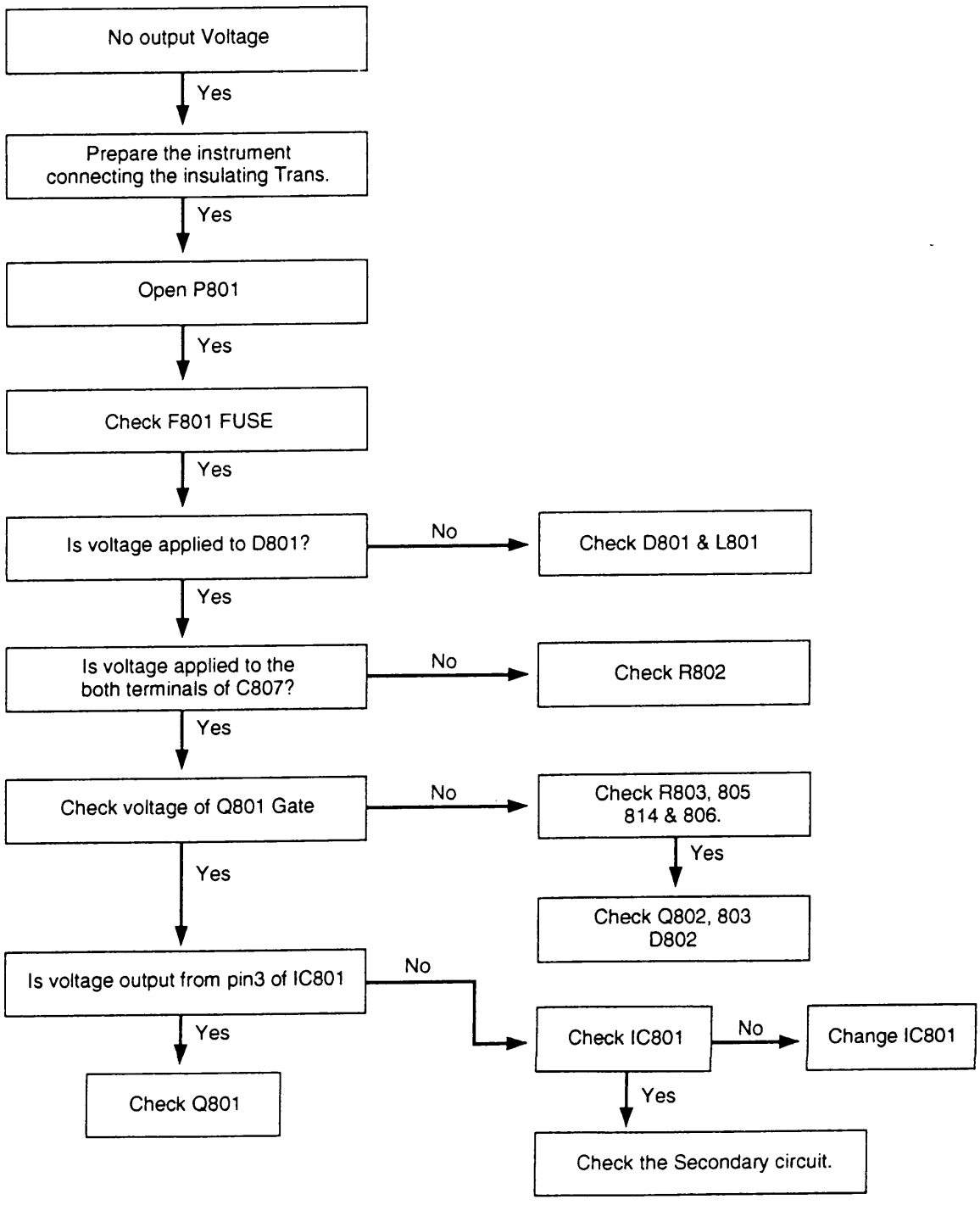
C.


Broadcast signal is not received when changing channel.
Is the external ANT connected to RF IN of VCR and RF OUT to TV?
No
Check and change the cable connection state.
Yes
Does the TV CH correspond to VCR CH
No
Set the TV CH to same VCR CH.
Yes
Is the output of pin ⑱ ⑦⓪ ⑦① ⑦② of IC701 normal?
No
Check IC701.
Yes
Is pin ⑨ of IC701 "L"?
No
Is pin ⑦⑧ of IC601 "L"?
No
Is ⎍⎍⎍ signal applied to pin ⑫ of IC601?
No
Check video Circuit.
Yes
Yes
Yes
Check TUNER and IF PCB.
No
Check connector and pattern.
Change IC601.

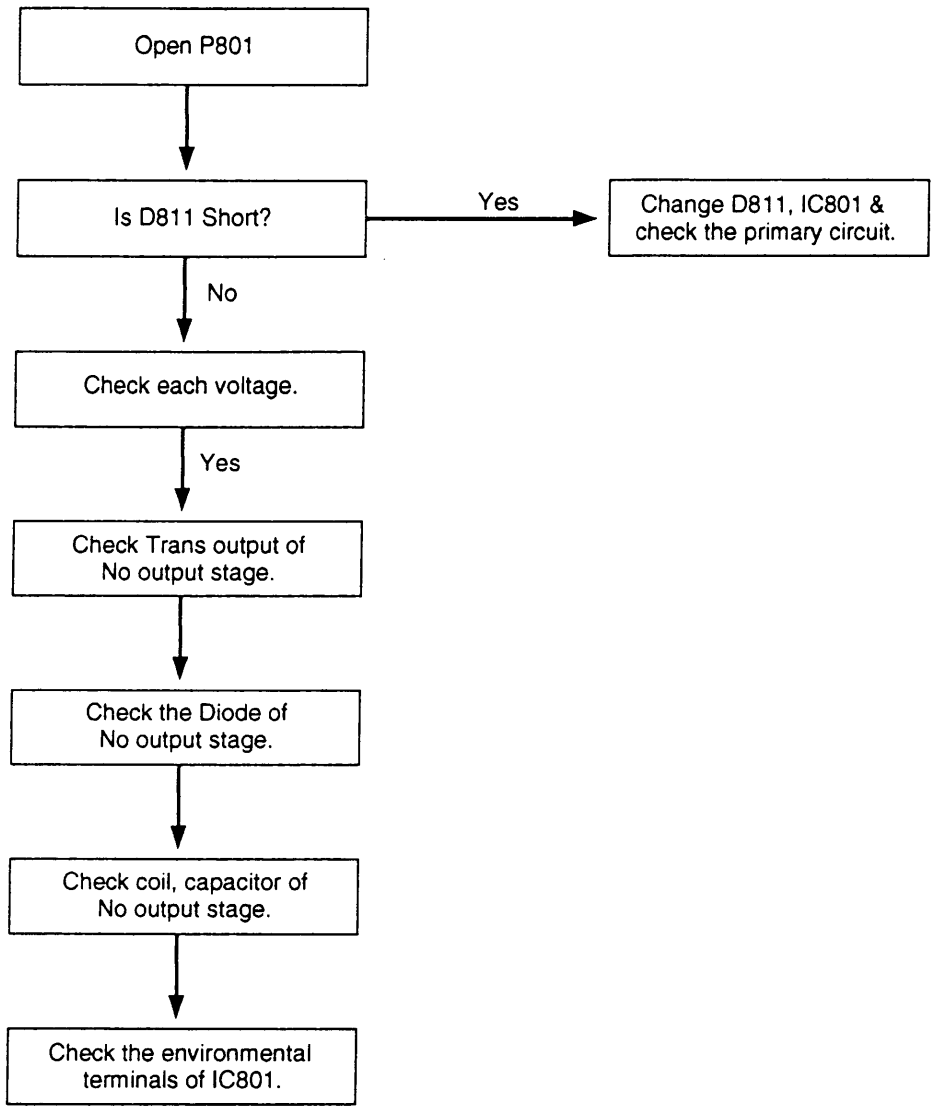
5-2. POWER CIRCUIT

- When change the parts which are out of order, first, remove the power plug from the socket and then discharge the voltage across between both terminals of C807. (Use an external scores of KΩ resistance)
- When check the primary circuit by using the oscilloscopes insulate the oscilloscope surely. (Use the isulating transformer) and must connect GND into the primary GND), (But there is no connection when check the secondary circuit.).
- When change IC801, check FUSE and Cement resistance surely.
- After completing the service, please chedk if SMPS shield case is adhered and P801 is connected.

A. CHECKING THE PRIMARY CIRCUIT.

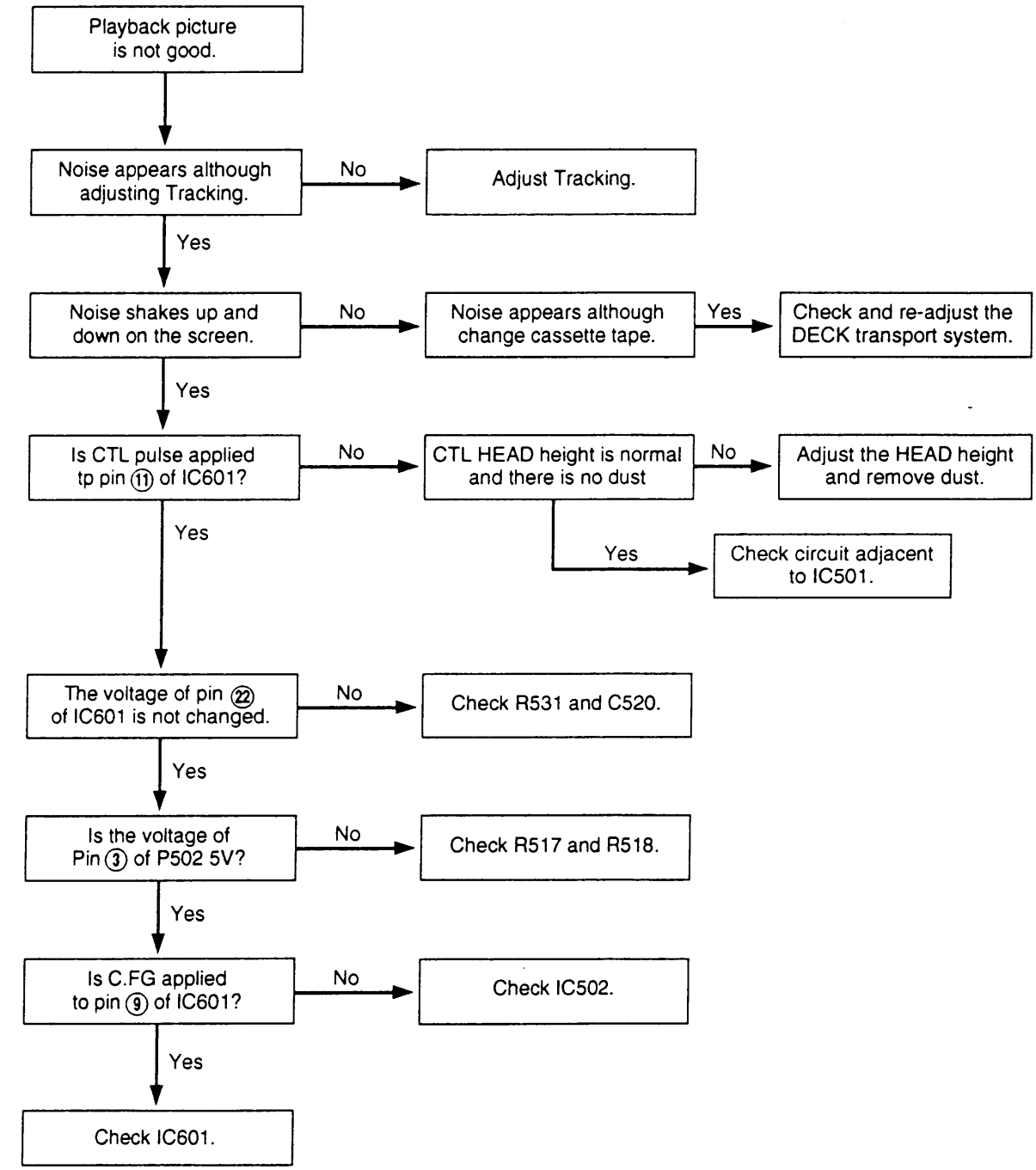


B. CHECKING THE SECONDARY CIRCUIT.

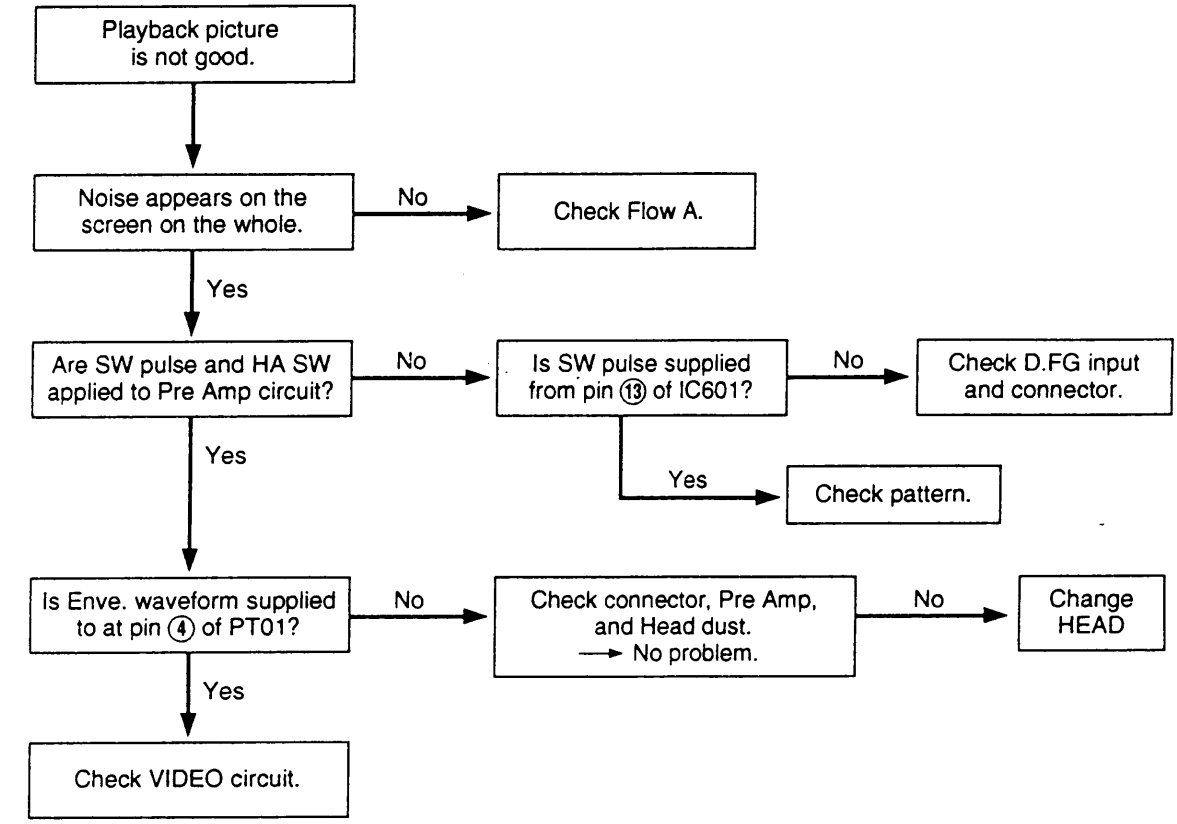

Open P801
Is D811 Short?
Yes
Change D811, IC801 & check the primary circuit.
No
Check each voltage.
Yes
Check Trans output of No output stage.
Check the Diode of No output stage.
Check coil, capacitor of No output stage.
Check the environmental terminals of IC801.

5-3. SERVO/SYSCON CIRCUIT

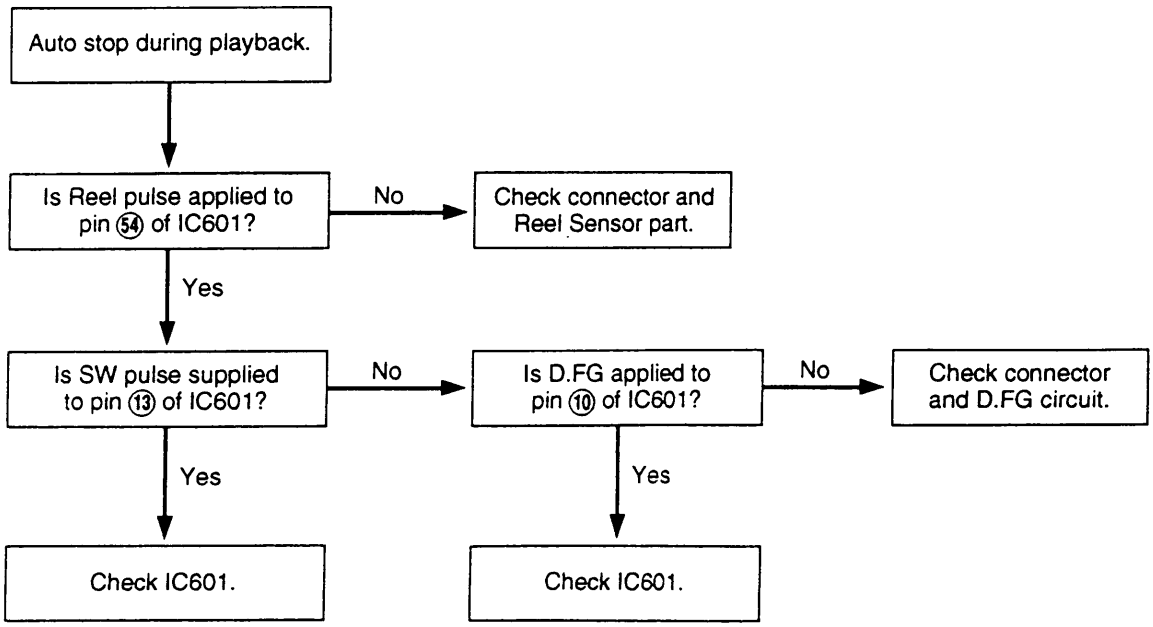
A.



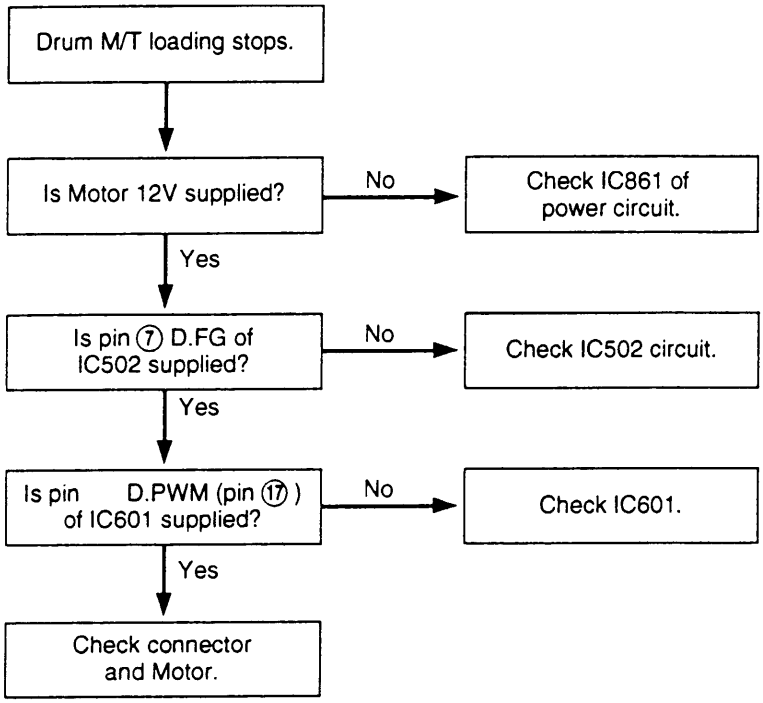
B.


Playback picture is not good.
Noise appears on the screen on the whole.
No
Check Flow A.
Yes
Are SW pulse and HA SW applied to Pre Amp circuit?
No
Is SW pulse supplied from pin ⑬ of IC601?
No
Check D.FG input and connector.
Yes
Yes
Check pattern.
Is Enve. waveform supplied to at pin ④ of PT01?
No
Check connector, Pre Amp, and Head dust.
→ No problem.
No
Change HEAD
Yes
Check VIDEO circuit.

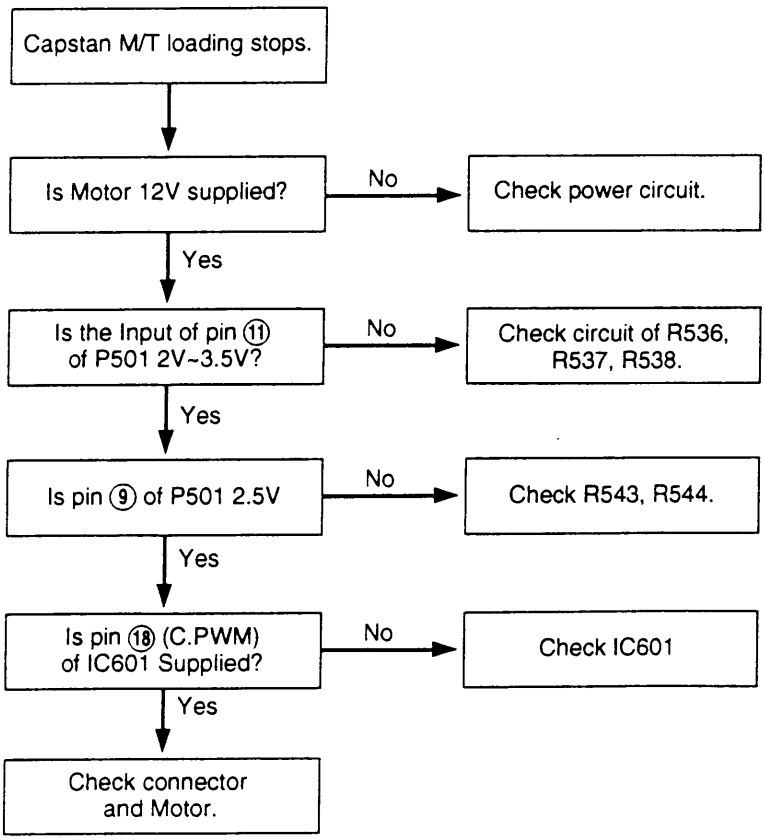
C.


Auto stop during playback.
Is Reel pulse applied to pin ㊹ of IC601?
No
Check connector and Reel Sensor part.
Yes
Is SW pulse supplied to pin ⑬ of IC601?
No
Is D.FG applied to pin ⑩ of IC601?
No
Check connector and D.FG circuit.
Yes
Yes
Check IC601.
Check IC601.

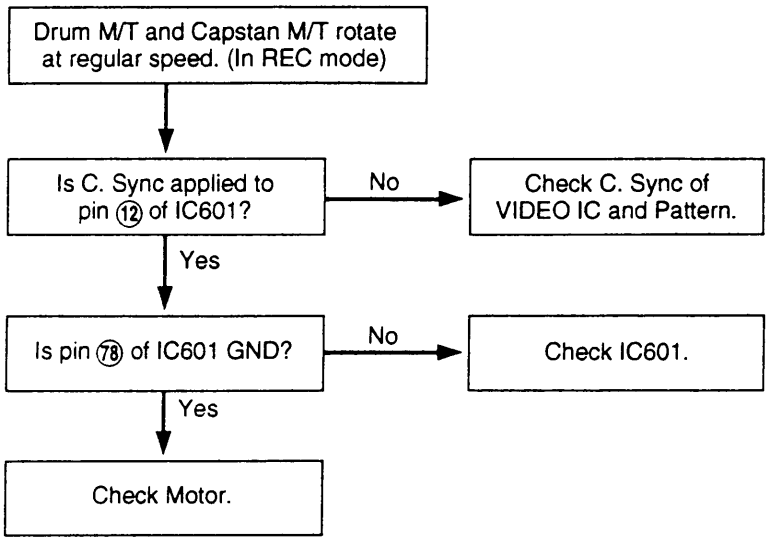
D.


Drum M/T loading stops.
Is Motor 12V supplied?
No
Check IC861 of power circuit.
Yes
Is pin ⑦ D.FG of IC502 supplied?
No
Check IC502 circuit.
Yes
Is pin D.PWM (pin ⑰) of IC601 supplied?
No
Check IC601.
Yes
Check connector and Motor.

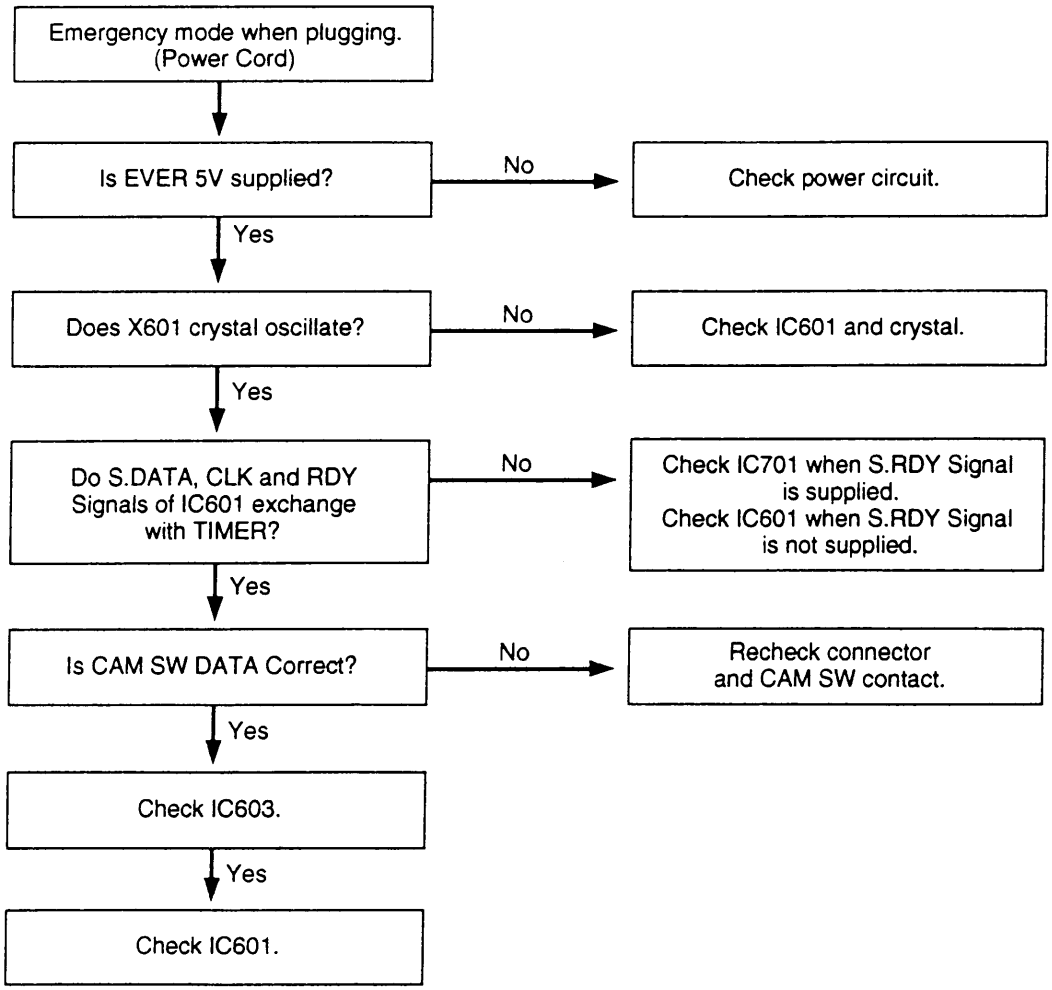
E.

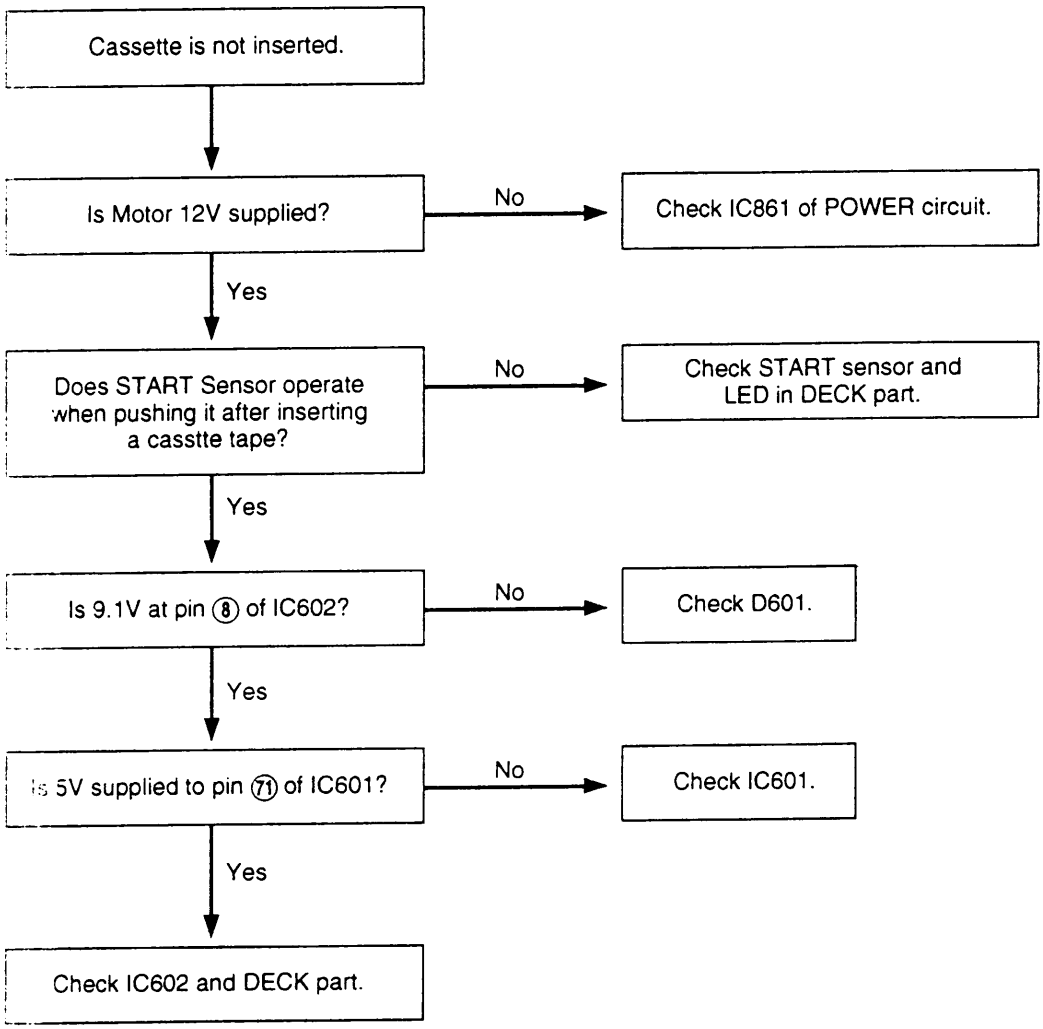

Capstan M/T loading stops.
Is Motor 12V supplied?
No
Check power circuit.
Yes
Is the Input of pin ⑪ of P501 2V~3.5V?
No
Check circuit of R536, R537, R538.
Yes
Is pin ⑨ of P501 2.5V
No
Check R543, R544.
Yes
Is pin ⑱ (C.PWM) of IC601 Supplied?
No
Check IC601
Yes
Check connector and Motor.

F.

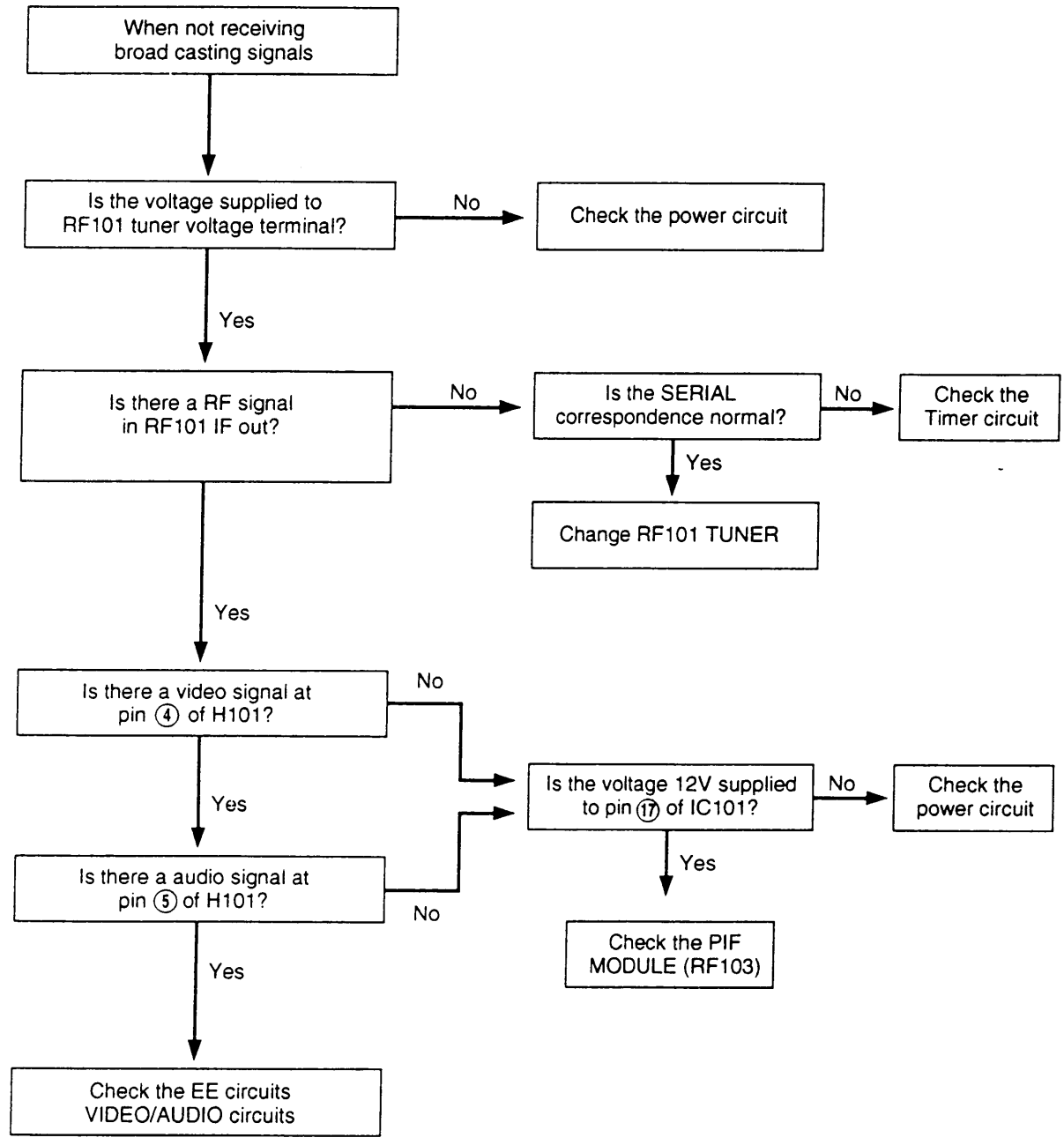

Drum M/T and Capstan M/T rotate at regular speed. (In REC mode)
Is C. Sync applied to pin ⑫ of IC601?
No
Check C. Sync of VIDEO IC and Pattern.
Yes
Is pin ⑦⑧ of IC601 GND?
No
Check IC601.
Yes
Check Motor.

G.


Emergency mode when plugging. (Power Cord)
Is EVER 5V supplied?
No
Check power circuit.
Yes
Does X601 crystal oscillate?
No
Check IC601 and crystal.
Yes
Do S.DATA, CLK and RDY Signals of IC601 exchange with TIMER?
No
Check IC701 when S.RDY Signal is supplied.
Check IC601 when S.RDY Signal is not supplied.
Yes
Is CAM SW DATA Correct?
No
Recheck connector and CAM SW contact.
Yes
Check IC603.
Yes
Check IC601.

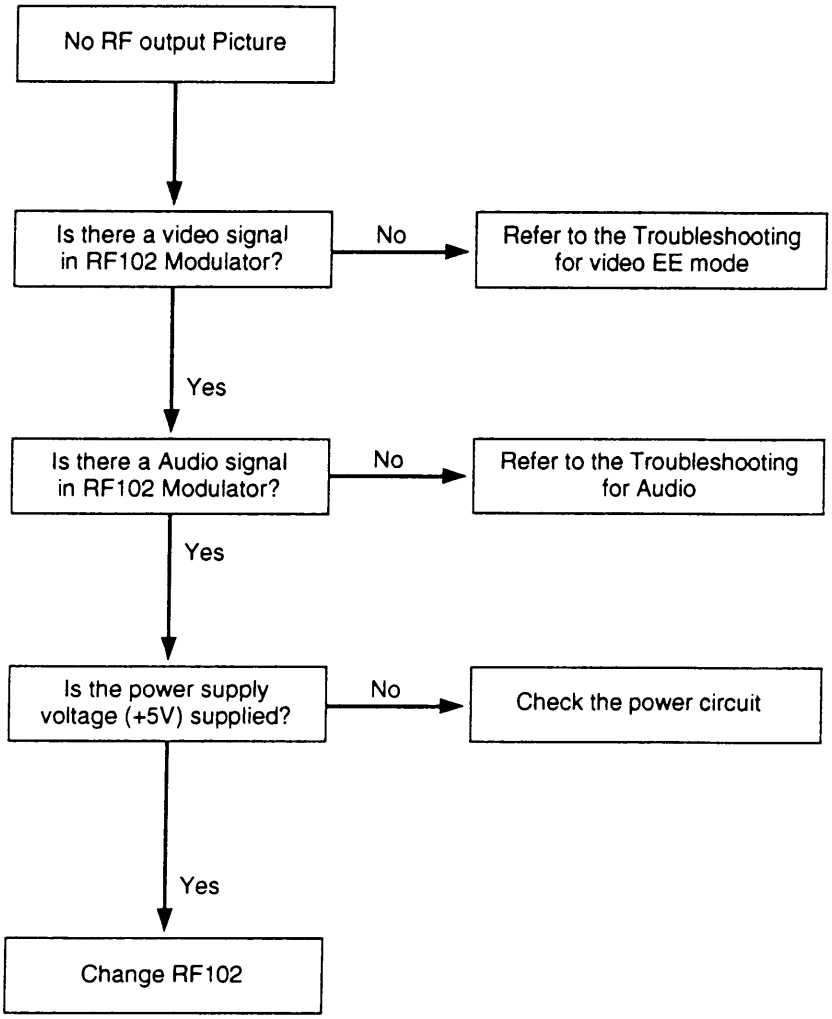

Cassette is not inserted.
Is Motor 12V supplied?
No
Check IC861 of POWER circuit.
Yes
Does START Sensor operate when pushing it after inserting a casstte tape?
No
Check START sensor and LED in DECK part.
Yes
Is 9.1V at pin (8) of IC602?
No
Check D601.
Yes
Is 5V supplied to pin (71) of IC601?
No
Check IC601.
Yes
Check IC602 and DECK part.

B.

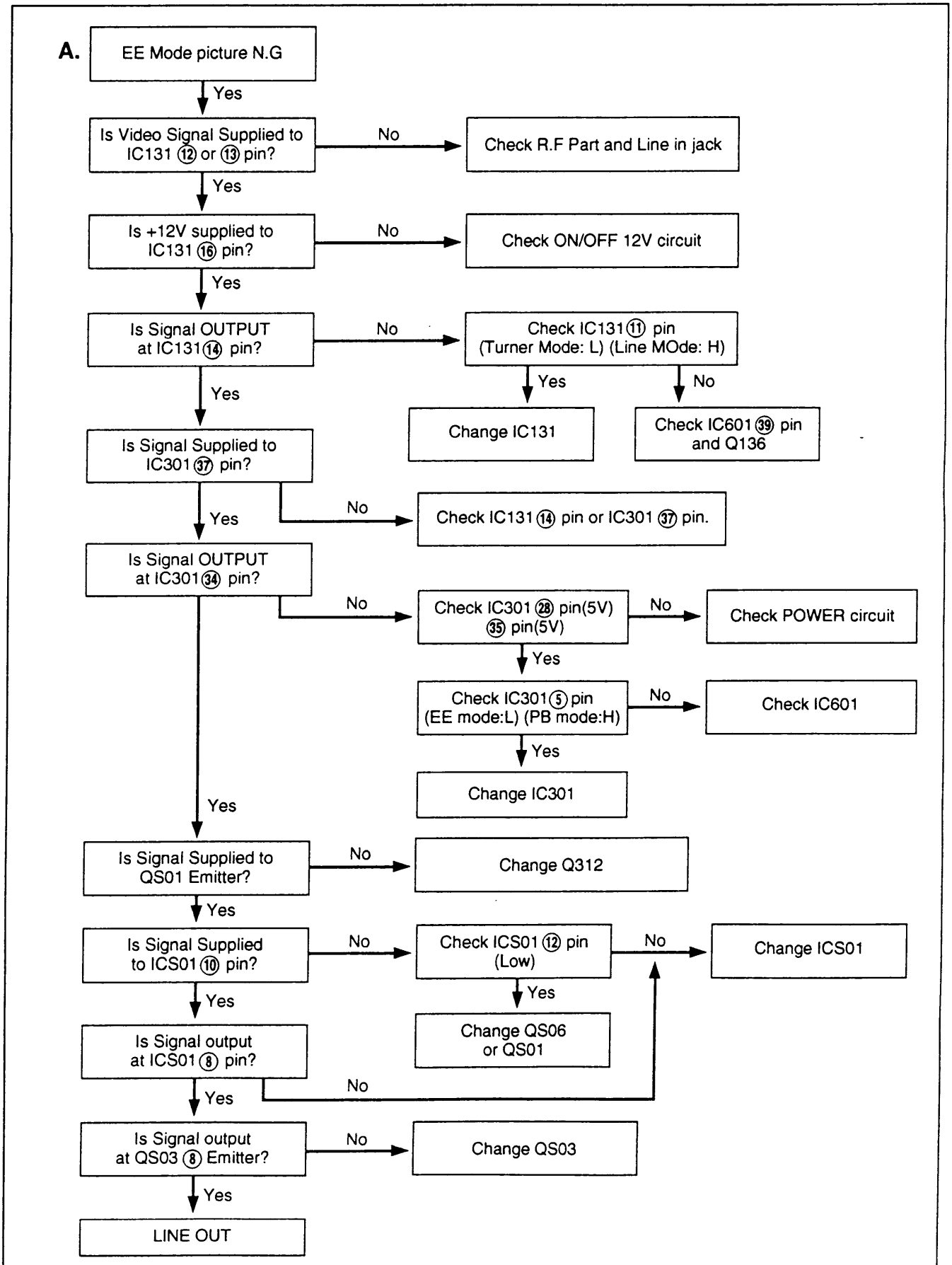

When not receiving broad casting signals
Is the voltage supplied to RF101 tuner voltage terminal?
No
Check the power circuit
Yes
Is there a RF signal in RF101 IF out?
No
Is the SERIAL correspondence normal?
No
Check the Timer circuit
Yes
Change RF101 TUNER
Yes
Is there a video signal at pin ④ of H101?
No
Yes
Is the voltage 12V supplied to pin ⑰ of IC101?
No
Check the power circuit
Yes
Is there a audio signal at pin ⑤ of H101?
No
Check the PIF MODULE (RF103)
Yes
Check the EE circuits VIDEO/AUDIO circuits

5-4. RF SIGNAL SYSTEM (PIF CIRCUIT)

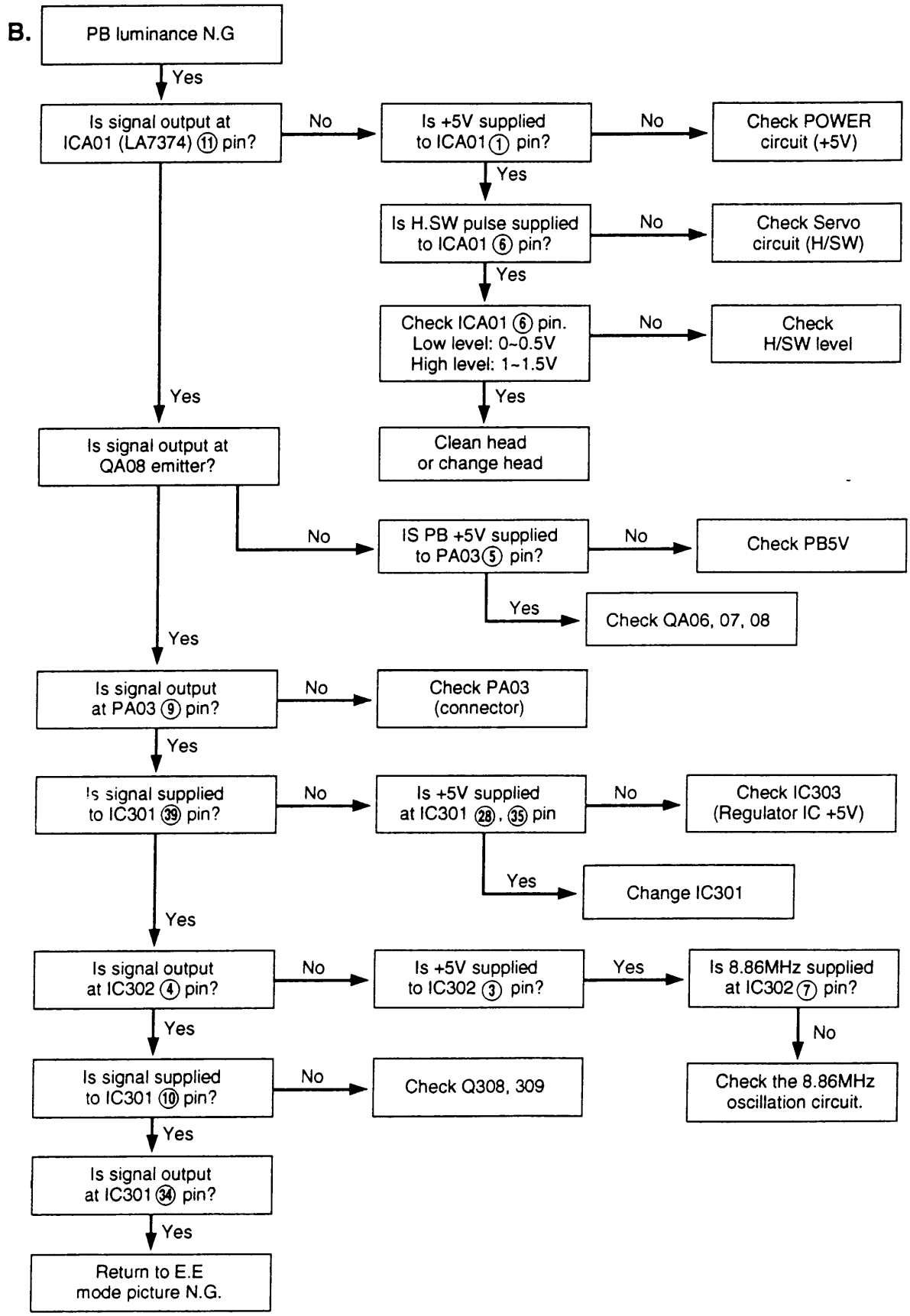
A.



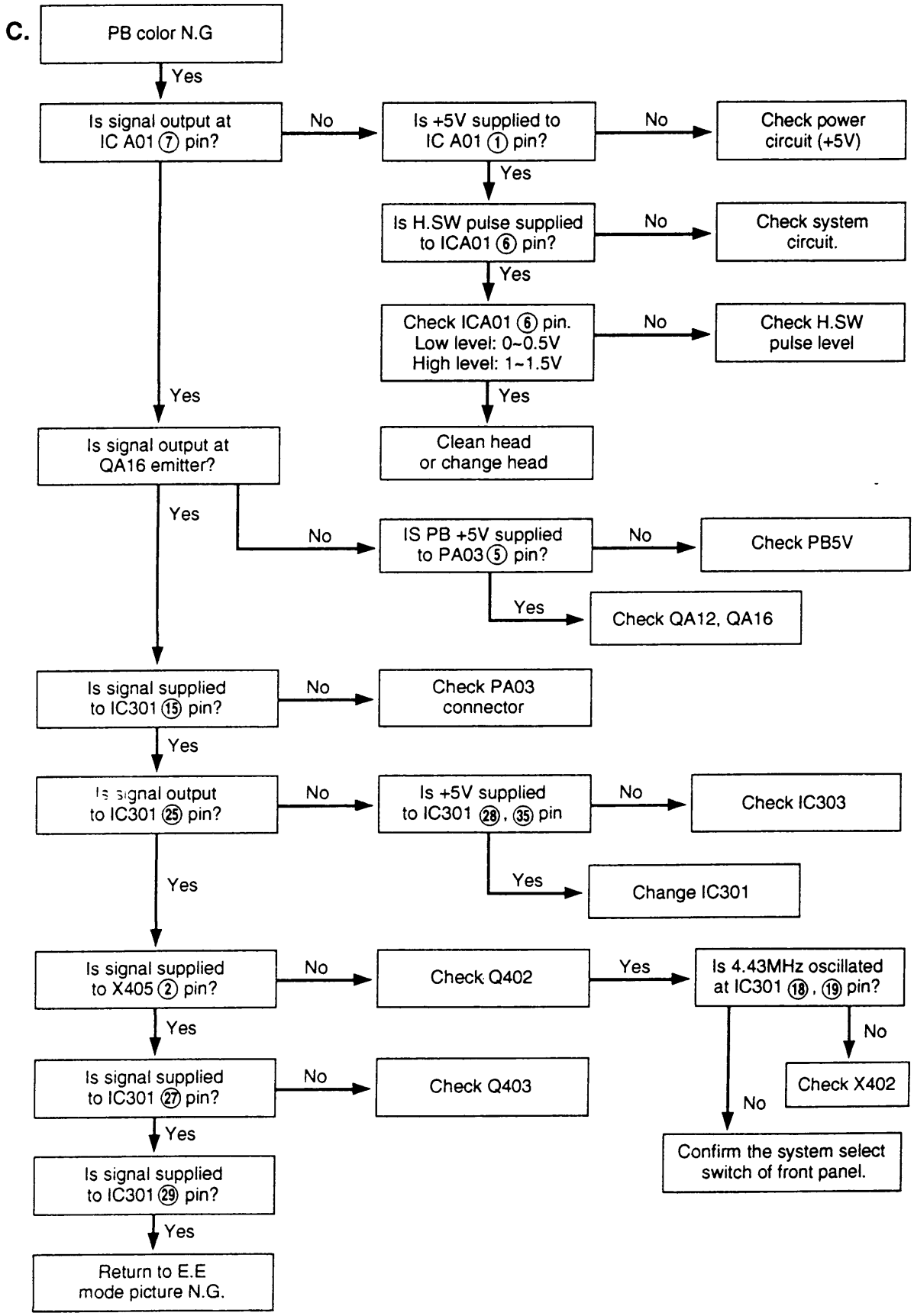
5-5. VIDEO CIRCUIT



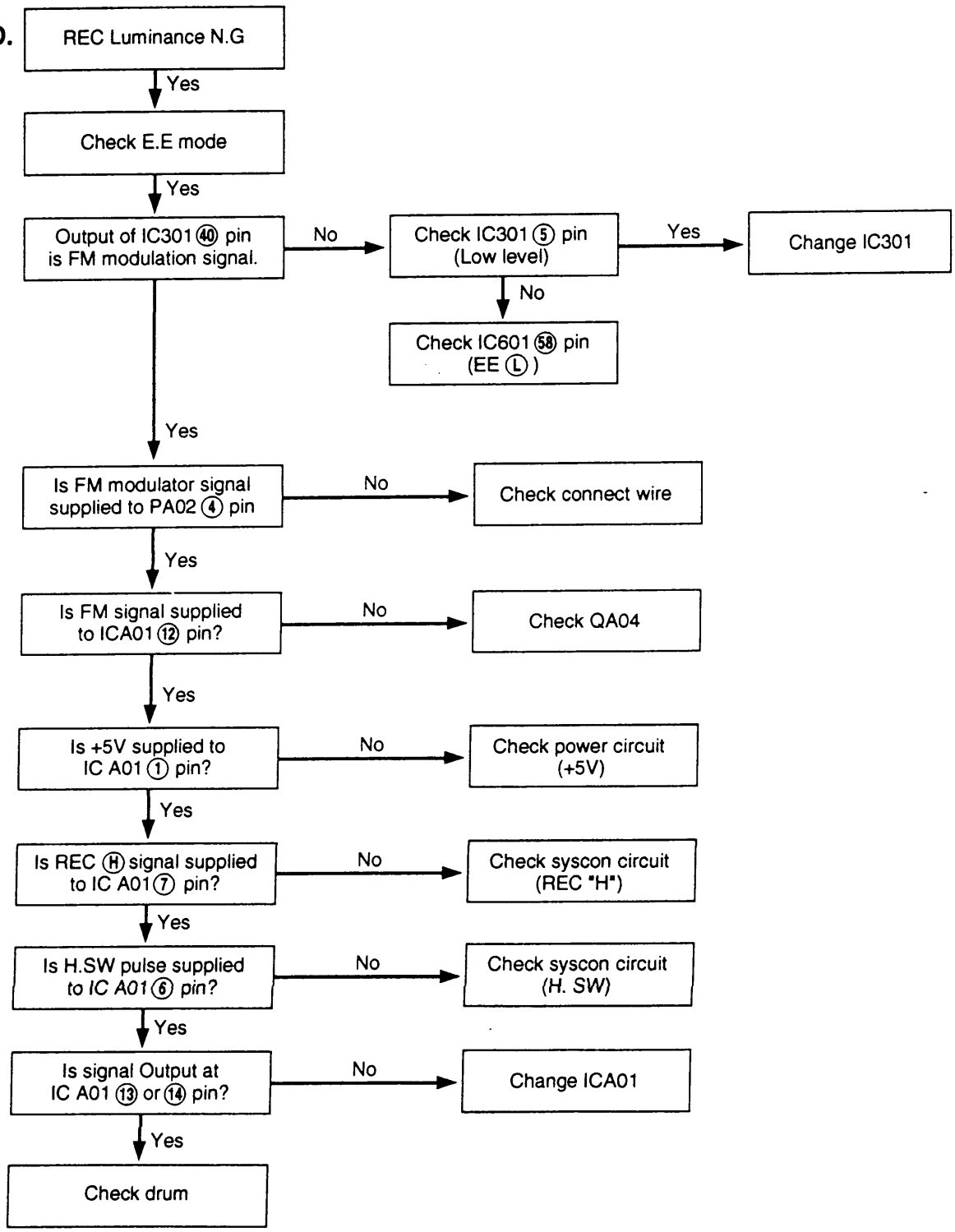
B.


PB luminance N.G
Yes
Is signal output at ICA01 (LA7374) ⑪ pin?
No
Is +5V supplied to ICA01 ① pin?
No
Check POWER circuit (+5V)
Yes
Is H.SW pulse supplied to ICA01 ⑥ pin?
No
Check Servo circuit (H/SW)
Yes
Check ICA01 ⑥ pin. Low level: 0~0.5V High level: 1~1.5V
No
Check H/SW level
Yes
Yes
Is signal output at QA08 emitter?
Clean head or change head
No
IS PB +5V supplied to PA03⑤ pin?
No
Check PB5V
Yes
Check QA06, 07, 08
Yes
Is signal output at PA03 ⑨ pin?
No
Check PA03 (connector)
Yes
Is signal supplied to IC301 ㊴ pin?
No
Is +5V supplied at IC301 ㉘, ㉟ pin
No
Check IC303 (Regulator IC +5V)
Yes
Change IC301
Yes
Is signal output at IC302 ④ pin?
No
Is +5V supplied to IC302 ③ pin?
Yes
Is 8.86MHz supplied at IC302 ⑦ pin?
Yes
No
Is signal supplied to IC301 ⑩ pin?
No
Check Q308, 309
Check the 8.86MHz oscillation circuit.
Yes
Is signal output at IC301 ㉞ pin?
Yes
Return to E.E mode picture N.G.

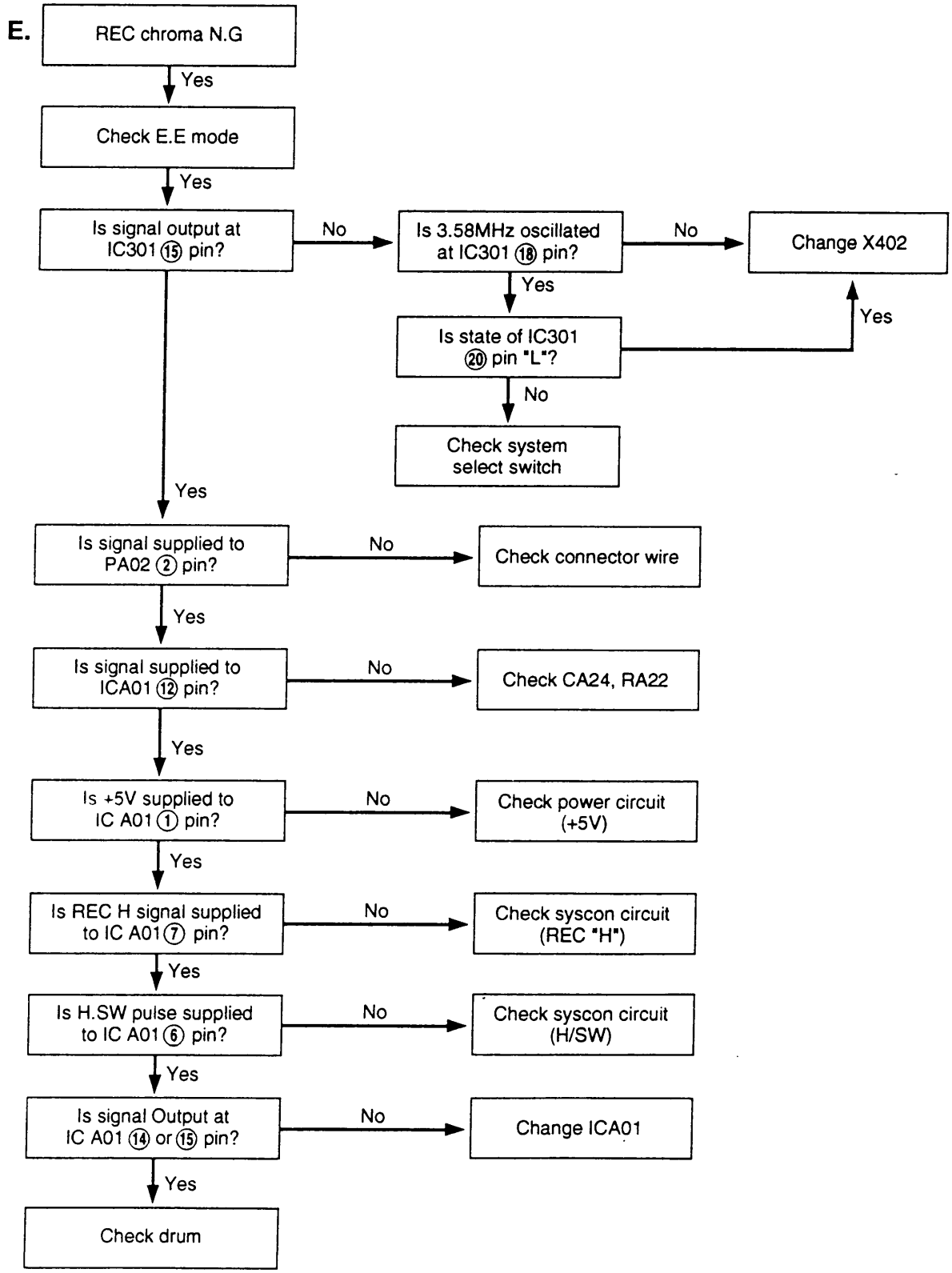
C.


PB color N.G
Yes
Is signal output at IC A01 ⑦ pin?
No
Is +5V supplied to IC A01 ① pin?
No
Check power circuit (+5V)
Yes
Is H.SW pulse supplied to ICA01 ⑥ pin?
No
Check system circuit.
Yes
Check ICA01 ⑥ pin. Low level: 0~0.5V High level: 1~1.5V
No
Check H.SW pulse level
Yes
Clean head or change head
Yes
Is signal output at QA16 emitter?
Yes
No
IS PB +5V supplied to PA03 ⑤ pin?
No
Check PB5V
Yes
Check QA12, QA16
Is signal supplied to IC301 ⑮ pin?
No
Check PA03 connector
Yes
Is signal output to IC301 ㉕ pin?
No
Is +5V supplied to IC301 ㉘, ㉟ pin
No
Check IC303
Yes
Change IC301
Yes
Is signal supplied to X405 ② pin?
No
Check Q402
Yes
Is 4.43MHz oscillated at IC301 ⑱, ⑲ pin?
No
Check X402
Yes
Is signal supplied to IC301 ㉗ pin?
No
Check Q403
No
Confirm the system select switch of front panel.
Yes
Is signal supplied to IC301 ㉙ pin?
Yes
Return to E.E mode picture N.G.

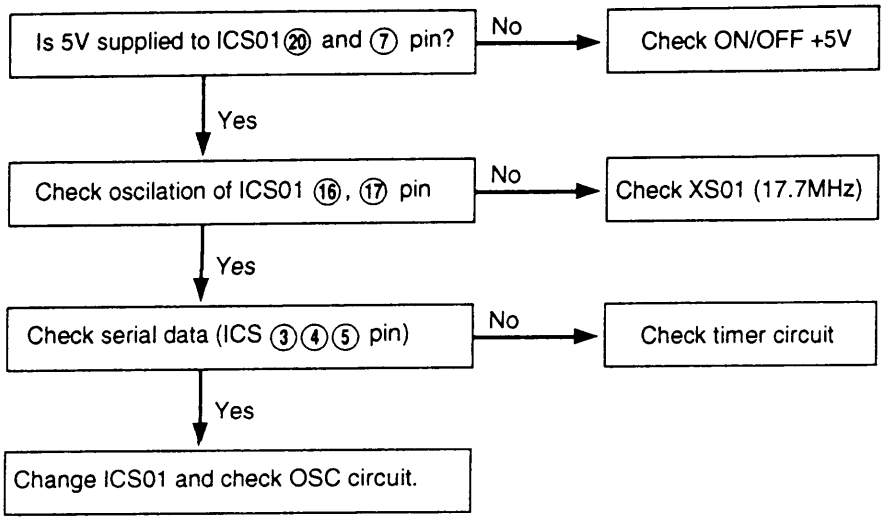
D.


REC Luminance N.G
Yes
Check E.E mode
Yes
Output of IC301 ㊵ pin is FM modulation signal.
No
Check IC301 ⑤ pin (Low level)
Yes
Change IC301
No
Check IC601 ㊽ pin (EE Ⓛ)
Yes
Is FM modulator signal supplied to PA02 ④ pin
No
Check connect wire
Yes
Is FM signal supplied to ICA01 ⑫ pin?
No
Check QA04
Yes
Is +5V supplied to IC A01 ① pin?
No
Check power circuit (+5V)
Yes
Is REC Ⓗ signal supplied to IC A01 ⑦ pin?
No
Check syscon circuit (REC "H")
Yes
Is H.SW pulse supplied to IC A01 ⑥ pin?
No
Check syscon circuit (H. SW)
Yes
Is signal Output at IC A01 ⑬ or ⑭ pin?
No
Change ICA01
Yes
Check drum

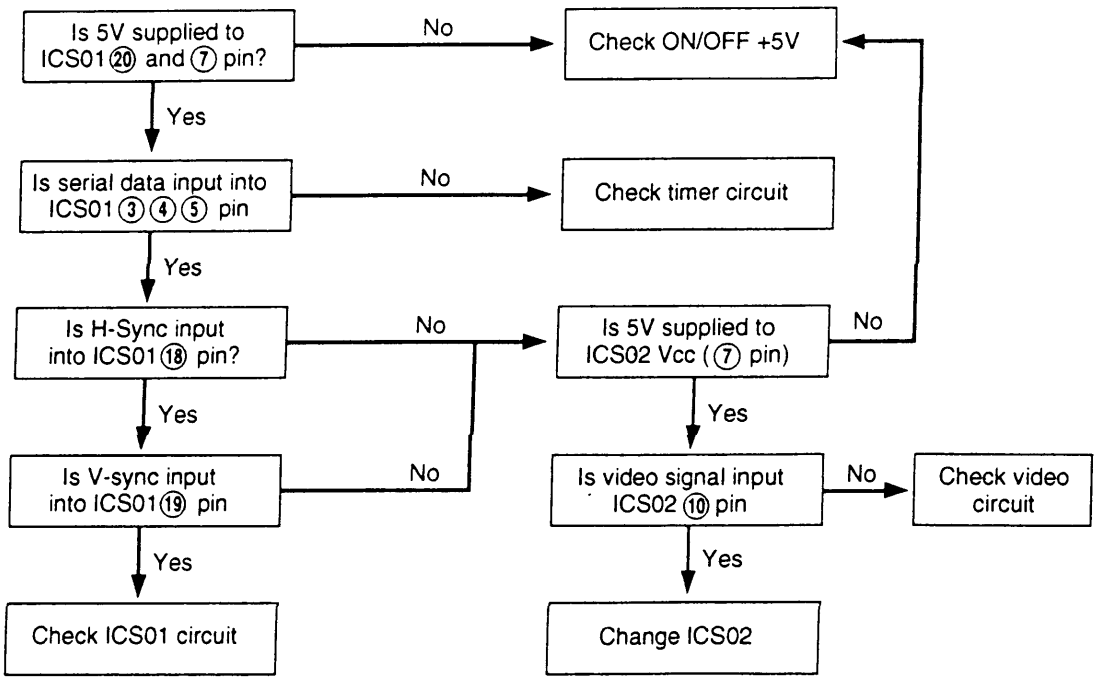
E.


REC chroma N.G
Yes
Check E.E mode
Yes
Is signal output at IC301 ⑮ pin?
No
Is 3.58MHz oscillated at IC301 ⑱ pin?
No
Change X402
Yes
Is state of IC301 ⑳ pin "L"?
Yes
No
Check system select switch
Yes
Is signal supplied to PA02 ② pin?
No
Check connector wire
Yes
Is signal supplied to ICA01 ⑫ pin?
No
Check CA24, RA22
Yes
Is +5V supplied to IC A01 ① pin?
No
Check power circuit (+5V)
Yes
Is REC H signal supplied to IC A01 ⑦ pin?
No
Check syscon circuit (REC "H")
Yes
Is H.SW pulse supplied to IC A01 ⑥ pin?
No
Check syscon circuit (H/SW)
Yes
Is signal Output at IC A01 ⑭ or ⑮ pin?
No
Change ICA01
Yes
Check drum

F. OSD Picture N.G

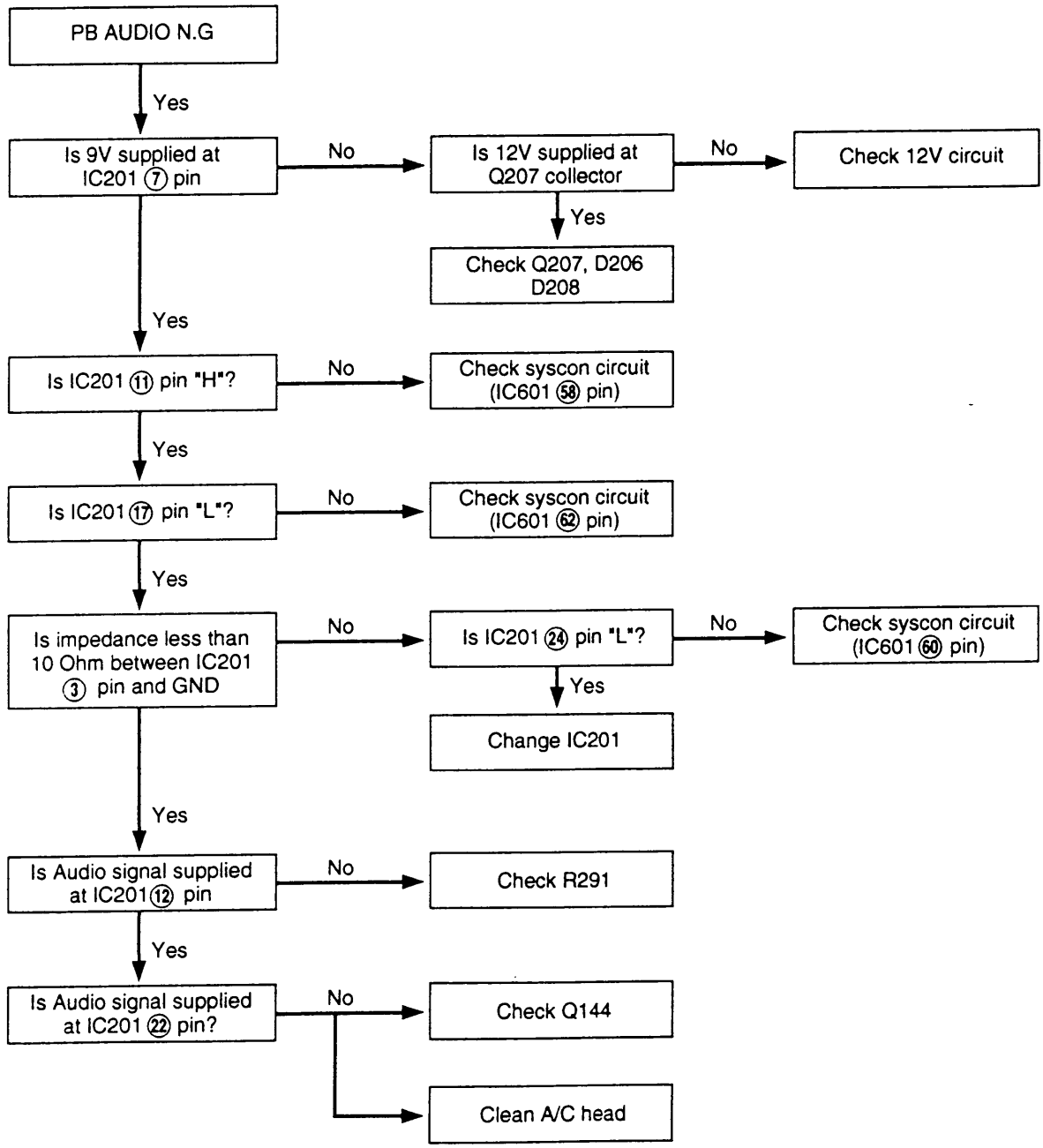


G. OSD Character N.G

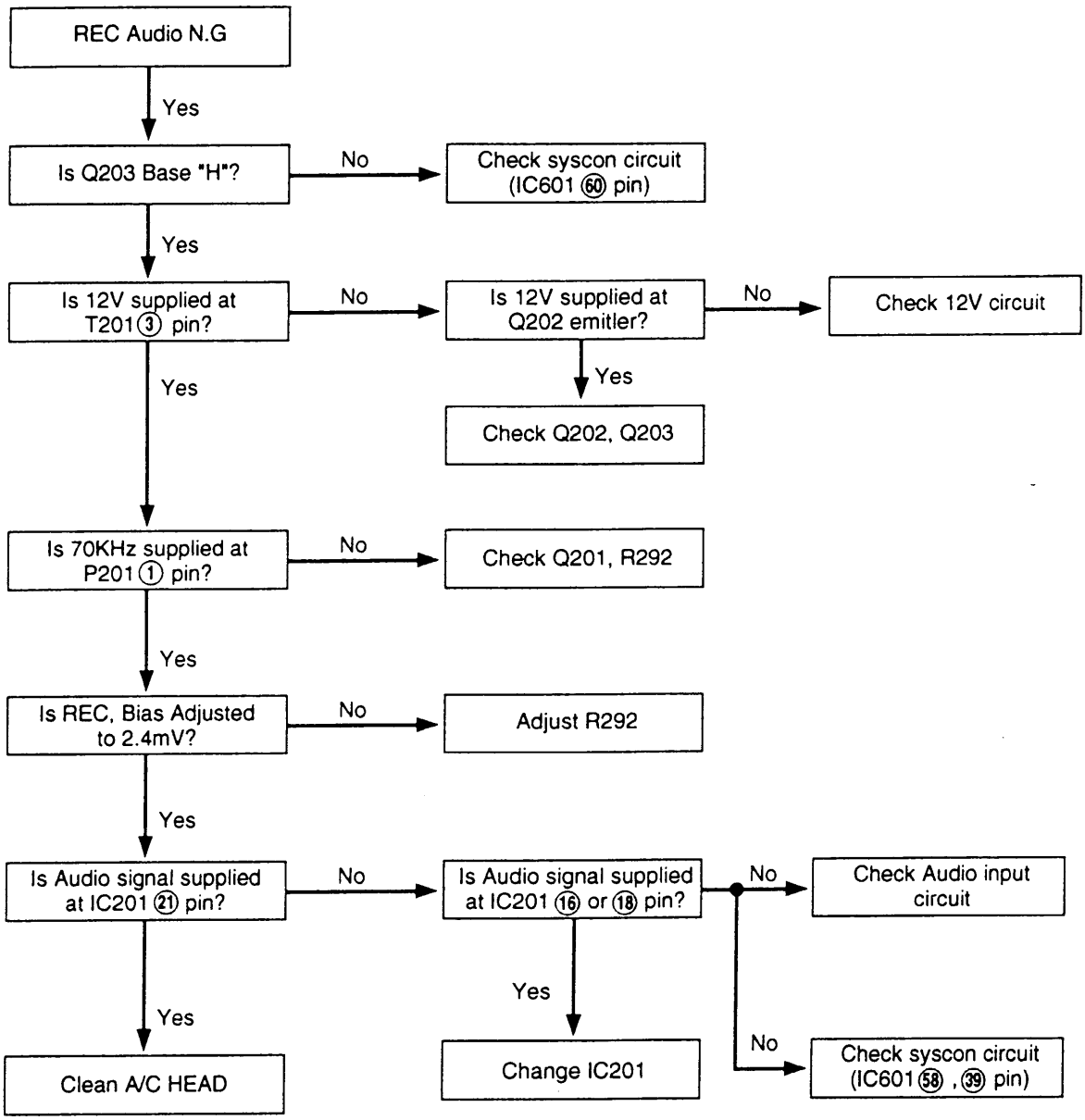


5-6. AUDIO CIRCUIT

A.

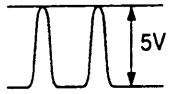
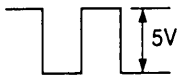
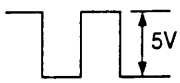


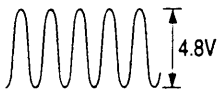
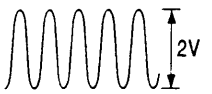
B.

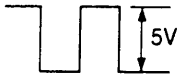
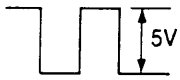
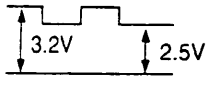

REC Audio N.G
Yes
Is Q203 Base "H"?
No
Check syscon circuit (IC601 ⑥⓪ pin)
Yes
Is 12V supplied at T201 ③ pin?
No
Is 12V supplied at Q202 emitter?
No
Check 12V circuit
Yes
Check Q202, Q203
Yes
Is 70KHz supplied at P201 ① pin?
No
Check Q201, R292
Yes
Is REC, Bias Adjusted to 2.4mV?
No
Adjust R292
Yes
Is Audio signal supplied at IC201 ㉑ pin?
No
Is Audio signal supplied at IC201 ⑯ or ⑱ pin?
No
Check Audio input circuit
Yes
Yes
Change IC201
No
Check syscon circuit (IC601 ⑤⑧ , ③⑨ pin)
Yes
Clean A/C HEAD

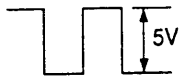
5-7. IC, TR VOLTAGE

• DC voltage of servo-syscon IC (IC601)

PIN NO	PB	REC	REMARK
1	0.14	0.14	 DRUM, PG INPUT
2	4.7	4.7	SERIAL INPUT
3	0	0	SERIAL OUTPUT
4	4.7	4.7	SERIAL CLK
5	5	5	
6	5	5	
7	0.5	0.5	C-SYNC INPUT
8	STILL, SLOW/SP HEAD (L), LP/SLP HEAD (H)		
9	3.0	3.0	CAPSTAN F.G INPUT
10	3.0	3.0	 DRUM F.G INPUT
11	3.0	3.0	C.T.L INPUT
12	0.5	0.5	C-SYNC INPUT
13	2.5	2.5	 VIDEO HEAD SWITCHING
14	5	5	AUDIO NOMAL (H), Hi Fi (L)
15	0	0	ON SPECIAL PLAY Q.V-SYNC
16	0	2.5	(ON RECORDING)
17	2.6	2.6	DRUM M/T CONTROL PWM
18	2.6	2.6	CAPSTAN M/T CONTROL PWM

PIN NO	PB	REC	REMARK
19	0	0	G.N.D
20	5	5	EVER 5V
21	3.0	3.0	P.G DELAY ADJUST
22	5	5	
23	0	0	G.N.D
25	1.2V~4.0V		VIDEO AUTO TRACKING ENVE DETECTING WAVE INPUT LEVEL
26	5	5	
27	2.9	2.9	DRUM HEAD SELECT INPUT
28	2.5	2.5	NTSC/PAL SELECT INPUT
29	5	5	RESET (L)
30	5	5	EVER 5V
31	2.4	2.4	 CRYSTAL 12MHz TERMINAL CONNECTION
32	1.4	1.4	 CRYSTAL 12MHz TERMINAL CONNECTION
33	0	0	G.N.D
34	0	0	
35	TAPE SPEED SP (L)/LP, SLP (H)		
36	2.5	2.5	COLOR LOTARY SWITCHING OUTPUT R (CH 1:H)/L (CH 2: L)
37	0	5	
38	50Hz (L)/60Hz (H)		
39	TV MODE (H)/LINE MODE (L)		
40	TV MODE (H)/VCR MODE (L)		
41	0	0	POWER ON/OFF CONTROL PORT POWER ON (L)
42	0	0	
43	0	0	
44	2.5	2.5	

PIN NO	PB	REC	REMARK
45	0	0	CAPSTAN M/T FORWARD (H)/REV (L)
46	0	0	
47	0	0	
48	0	0	
49	0	0	
50	5	5	TYPE START SENSOR INPUT
51	5	5	CST DOWN/CST OUT INPUT (L)
52	0	5	REC SAFTY SW INPUT
53	2.5	2.5	 REEL PULSE
54	2.5	2.5	 REEL PULSE
55	5	5	TAPE END SENSOR INPUT
56	0	0	
57	TRACK (H) PORT When special expect playback (L) output by using.		
58	5	0	TIME Delay in the EE/REC MODE, (L) will output
59	0	5	PLAY KEY IN MODE, PB (L) will output
60	0	5	Delay RECORD EXcutive output
61	5	5	
62	0	0	AUDIO MUTE (H) OUTPUT
63	When the tape speed is LP mode, the (H) will be output.		
64	When the tape speed is SLP mode, the (H) will be output.		
65	When the tape speed is SP mode, the (H) will be output.		
66	0	0	
67	0	0	G.N.D
68	5	5	EVER 5V
69	0	0	
70	1.9	1.9	 SCHMITT TRIGGER LEVEL CONTROL

PIN NO	PB	REC	REMARK
71	0	0	LOADING M/T FORWARD (H) OUTPUT
72	0	0	LOADING M/T REVERSE (H) OUTPUT
73	5	5	CAM SW CONTROL
74	0	0	CAM SW CONTROL
75	0	0	CAM SW CONTROL
76	0	0	CAM SW CONTROL
77	5	5	EVER 5V
78	0	0	
79	1.1	1.1	SERIAL READY OUTPUT PORT
80	2.5	2.5	 5V SERVO REFERENCE OUTPUT

IC 501 (MC4558C)

NO	PB (SP)
1	2.9
2	3.1
3	3.0
4	0
5	3.1
6	3.1
7	3.1
8	5.7

IC502 (MC4558C)

NO	PB (SP)
1	2.9
2	3.1
3	3.0
4	0
5	3.1
6	3.1
7	3.1
8	5.7

IC603 (KA8306)

NO	PB (SP)
1	0
2	0.5
3	0.5
4	0
5	0
6	0
7	12
8	6
9	12
10	0.5

IC 861 (PQ12RF11)

NO	PB (SP)
1	14
2	12
3	0
4	4.1

• **DC voltage of PRE-AMP IC (LA7374, ICA01)**

PIN NO.	PB-V	REC-V
1	5	0
2	5	0
3	3.8 (1.2)	0
4	0	0
5	0	0
6	0-1.7	0-1.7
7	1.5 (0.2)	4.3
8	0	0
9	3.7 (0.2)	3.7
10	0.8	0.6
11	2.5 (0.2)	5
12	0	1.7
13	0	2.3 (0.5)
14	0	1.9
15	0	1.7 (0.2)
16	0	0
17	0	4 (2.5)
18	0	0.1 (0.1)
19	0	0
20	0	4
21	0	4
22	0	0
23	0	0
24	0	0.1
25	0	0
26	0	0
27	0	0
28	0	0.1
29	0	0
30	0	0

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of D-E/F IC of the PRE-AMP circuit (MC14031B, ICA02)**

PIN NO.	PB-V	REC-V
1	0	0
2	5	5
3	0.2-4.6	0.2-4.6
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	5	5
14	5	5

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of transistors of the PRE-AMP circuit.**

LOC.	PB-V			REC-V		
	E	C	B	E	C	V
QA01	1.5 (1.4)	5	2.2 (1.4)	0	0	0
QA02	0	0	4.8	0	0	0
QA04	1.7	5	2.3	0	0	0
QA06	3.2	1.8	2.5	0	0	0
QA07	0.8	3.6	1.5	0	0	0
QA08	3	5	3.6	0	0	0
QA09	3	0	0	0	0	0
QA11	5	5	0	0	0	0
QA12	1.8	5	2.5	0	0	0
QA13	0	0	2.9	0	0	0
QA14	0	2.9	0.5	0	0	0
QA15	5	5	0.8	0	0	0
QA16	1.8	5	2.5	0	0	0
QA17	0	5	0.5	0	0	0
QA18	2.1	0	1.5	0	0	0
QA20	5	5	0	0	0	0

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of video IC (LA7480, IC301) in PAL mode**

PIN NO.	PB-V	REC-V
1	0.1	0
2	2.2 (0.4)	0.6
3	3.3 (0.5)	2.4 (0.5)
4	2.5 (0.6)	2.9 (0.5)
5	4.4	2.7 (1.4)
6	4.4	2.8 (0.5)
7	4.4	4.4
8	2.5 (0.6)	2.4 (0.6)
9	3.3	2.2
10	2.2 (0.4)	2.1
11	0	0
12	2.2 (0.4)	2.1 (0.4)
13	3.0 (0.3)	2.5
14	2.4	1.8
15	2.3	3.1 (0.4)
16	2.4	2.4
17	2.3	2.3
18	3.9 (0.7)	3.9 (0.6)
19	2.5 (0.7)	3.4 (0.6)
20	0	0
21	5.2 (0.3)	5.1 (0.3)
22	2.9 (0.3)	3.1 (0.2)
23	0.4	3.2
24	3.2	3.2
25	2.4 (1.2)	2.4 (1.0)
26	2.0	2.0
27	2.0 (0.3)	2.0
28	5.0	5.1
29	1.9 (0.2)	1.9
30	4.2	4.2
31	3.1 (0.3)	3.6
32	0.2-4.6	0.2-4.6
33	0.1	0.1
34	2.0 (2.0)	2.0 (2.0)
35	5.0	5.1
36	0.2-4.5	0.2-4.5
37	3.4 (1.0)	3.4-1.0
38	1.5	1.5
39	3.3 (0.6)	3.3
40	3.7	3.1 (1.0)
41	1.2	1.1
42	0	2..6

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of CCD IC (IC302, LC89925) in PAL mode**

PIN NO.	PB-V	REC-V
1	0.3	0.3
2	0	0
3	5.0	0
4	3.6 (0.5)	0
5	0	0
6	2.5 (0.3)	0.4 (0.4)
7	1.2 (0.8)	0
8	9.0	0

• **DC voltage of 5V regulator IC (PQ05RF11, IC303) in PAL mode**

PIN NO.	PB-V	REC-V
1	5.7	5.8
2	5.1	5.1
3	0	0
4	5.6	5.6

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of transistors of the video circuit in PAL mode**

LOC.	PB-V			REC-V		
	E	C	B	E	C	V
Q301	3.9 (0.6)	0	3.3 (0.6)	3.0 (0.5)	0	2.4 (0.5)
Q302	4.5 (0.6)	0	3.9 (0.6)	3.7 (0.6)	0	3.1 (0.6)
Q303	0	3.9 (0.6)	0	0.0 (0.4)	3.0 (0.5)	0
Q307	0	0	4.9	0	0.0 (0.8)	0
Q308	1.0 (0.5)	5.0	1.6 (0.5)	0	0	0
Q309	1.3 (0.6)	0	0.7 (0.6)	0.7	0	0
Q310	0	0	5.0	0	2.6	0
Q311	0.4	5.0	5.0	0.5.1	5.1	5.1
Q312	2.6 (1.0)	0	2.0 (1.0)	2.6 (2.0)	0	2.0 (2.0)
Q401	0	0	0.1	0	0	0
Q402	1.7 (1.2)	5.1	2.4 (1.2)	1.7 (1.0)	5.0	2.4 (1.0)
Q403	1.9 (0.2)	5.1	2.5 (0.2)	1.9	5.0	2.5
Q404	1.9 (0.2)	5.1	0.0 (0.2)	1.9	5.0	- 0
Q405	1.9 (0.2)	5.1	0.0 (0.2)	1.9	5.0	0
Q406	4.5 (0.6)	0	5.1 (0.3)	4.5 (0.6)	5.0	5.1 (0.2)
Q409	2.6 (3.6)	5.0	3.2 (3.6)	0	0	0
Q410	0	3.2 (3.6)	0	0	0	5.0
Q411	3.2 (0.8)	5.1	3.9 (0.6)	3.3 (0.6)	5.0	3.9 (0.4)
Q412	0	5.0	0.0 (0.2)	0	5.0	0
Q413	0.9	0	0.2	0.7	0	0
Q415	0	5.1	0	0	5.0	0

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of OSD IC (168K88E6ML, ICS01)**

PIN NO.	PB-V	REC-V
1	3.0 (7.3)	3.0 (7.0)
2	2.5 (4.9)	2.5 (5.0)
3	5.0	5.0
4	0.4-5.0	5.0
5	0.4-5.0	0.5-0.5
6	4.4	4.4
7	5.0	5.0
8	2.6 (2.0)	2.6 (2.0)
9	3.8	3.6
10	2.6 (2.0)	2.6 (2.0)
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	2.3 (3.7)	2.3 (2.7)
17	2.3 (2.7)	2.3 (2.7)
18	0.0-5.0	0.0-5.0
19	5.0	5.0
20	5.0	5.0

• **DC voltage of SYNC. separator IC (LVA519S, ICS02) in PAL mode**

PIN NO.	PB-V	REC-V
1	2.8 (1.8)	2.8 (1.7)
2	1.4	1.4
3	1.4	1.4
4	1.7 (3.0)	1.7 (3.0)
5	0	0
6	1.2 (1.4)	1.2 (1.4)
7	5.0	5.0
8	0.0-5.0	0.0-5.0
9	5.0	5.0

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of transistors of the OSD circuit in PAL mode**

LOC.	PB-V			REC-V		
	E	C	B	E	C	V
QS01	2.6 (2.0)	2.6 (2.0)	1.8 (2.0)	2.6 (2.0)	2.6 (2.0)	1.8 (2.0)
QS02	1.2 (2.0)	2.6 (2.0)	1.2 (2.0)	0.6 (2.0)	2.6 (2.0)	0.6 (2.0)
QS03	3.4 (2.0)	0	2.6 (2.0)	3.4 (2.0)	0	2.6 (2.0)
QS04	0 (0.3)	2.2 (2.8)	0	0 (0.3)	2.2 (2.8)	0
QS05	2.2 (2.8)	2.2 (0.8)	1.8	2.2 (2.8)	2.2 (2.8)	0
QA06	0	2.6 (2.0)	0	0	2.6 (2.0)	0

• **DC voltage of input select IC (MC14053B, IC131)**

PIN NO.	PB-V	REC-V
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	12	12
12	6	6
13	6	6
14	6	6
15	0	0
16	12	12

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of transistors of switch and PIF circut in PAL/Line mode**

LOC.	PB-V			REC-V		
	E	C	B	E	C	V
Q130	0	0	0	0	0	0
Q131	0	0	0	0	0	0
Q132	2.6 (2.0)	12	3.3 (2.0)	2.6 (2.0)	12	3.3 (2.0)
Q133	0	0-9	0-0.7	0	-0.12~0.04	0~0.7
Q136	0	12	0	0	12	0
Q137	12	0	12	12	0	12
Q138	12	0	12	12	0	12
Q139	12	12	9	12	12	9
Q140	6.8 (D)	0 (G)	6.4 (S)	8.0 (D)	0 (G)	7 (S)
Q141	0	0	5	0	0	5
Q142	0	12	0	0	12	0
Q143	0	12	0	0	12	0
Q144	0	0 (1.3)	0.3	0	0	0

• **DC voltage of transistors of the IF module circuit in PAL-B/G mode**

LOC.	PB-V			REC-V		
	E	C	B	E	C	V
Q101	0	0	0	0	12	0
Q102	0.6	10	1.4	0.6	0.6	1.3
Q103	4	12	0	4	12	4.5

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of if IC (LA7530N, IC101)**

PIN NO.	PB-V	REC-V
1	5.8	5.8
2	4.7 (0.7)	4.7 (0.7)
3	5.8 (4.0)	5.8 (4.0)
4	5.1	5.1
5	5.1	5.1
6	4.5	4.5
7	4.5	4.5
8	0	0
9	1.1	1.1
10	7.5	7.5
11	7.8	7.8
12	3.9	3.9
13	8.5	8.5
14	8.5	8.5
15	4.0	4.0
16	5 (4.0)	5 (4.0)
17	12	12
18	0	0
19	3.1	3.1
20	3.1	3.1

• **DC voltage of sound carrier converter IC (LA7975, IC103) in PAL-B/G mode**

PIN NO.	PB-V	REC-V
1	3.1	3.1
2	12	12
3	0	0
4	12	12
5	11	11

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* *The value of pulse waveform is DC voltage between low and high level.*

• DC voltage of Audio IC (BA7790LS, IC201)

PIN NO.	PB-V	REC-V
1	0	0
2	3.5	3.5
3	0	0 (50)
4	0	0
5	9.2	9.2
6	3.6	3.6
7	9.3	9.3
8	3.6	3.6 (0.28)
9	0	0
10	3.6	3.6 (0.28)
11	4.2	0.7
12	4.2	4.2 (0.28)
13	3	3.2
14	0	0
15	4.2	4.3
16	4.2	4.2
17	0	0.3
18	4.2	4.3
19	4.2	4.3
20	0	0
21	4.2	4.2
22	4.0	4.2
23	0	0
24	0.1	5.0

• DC voltage of transistors of switch and PIF circut in PAL/Line mode

LOC.	PB-V			REC-V		
	E	C	B	E	C	V
Q201	0	0.3	0.3			
Q202	12.5	0	12.5	12.5	12.5	12
Q203	0	12.5	0	0	0	5
Q204	0	0	6.6	0	0	6.6
Q205	0	0	6.7	0	0	6.7
Q206	0	6.6	0.5	0	6.6	0.5
Q207	9.3	13	10	9.3	12.5	10

* ( ) voltages are AC peak to peak value.
* DC value of video signal is sync. tip voltage.
* The value of pulse waveform is DC voltage between low and high level.

• **DC voltage of TIMER IC (IC701, PAL MODE)**

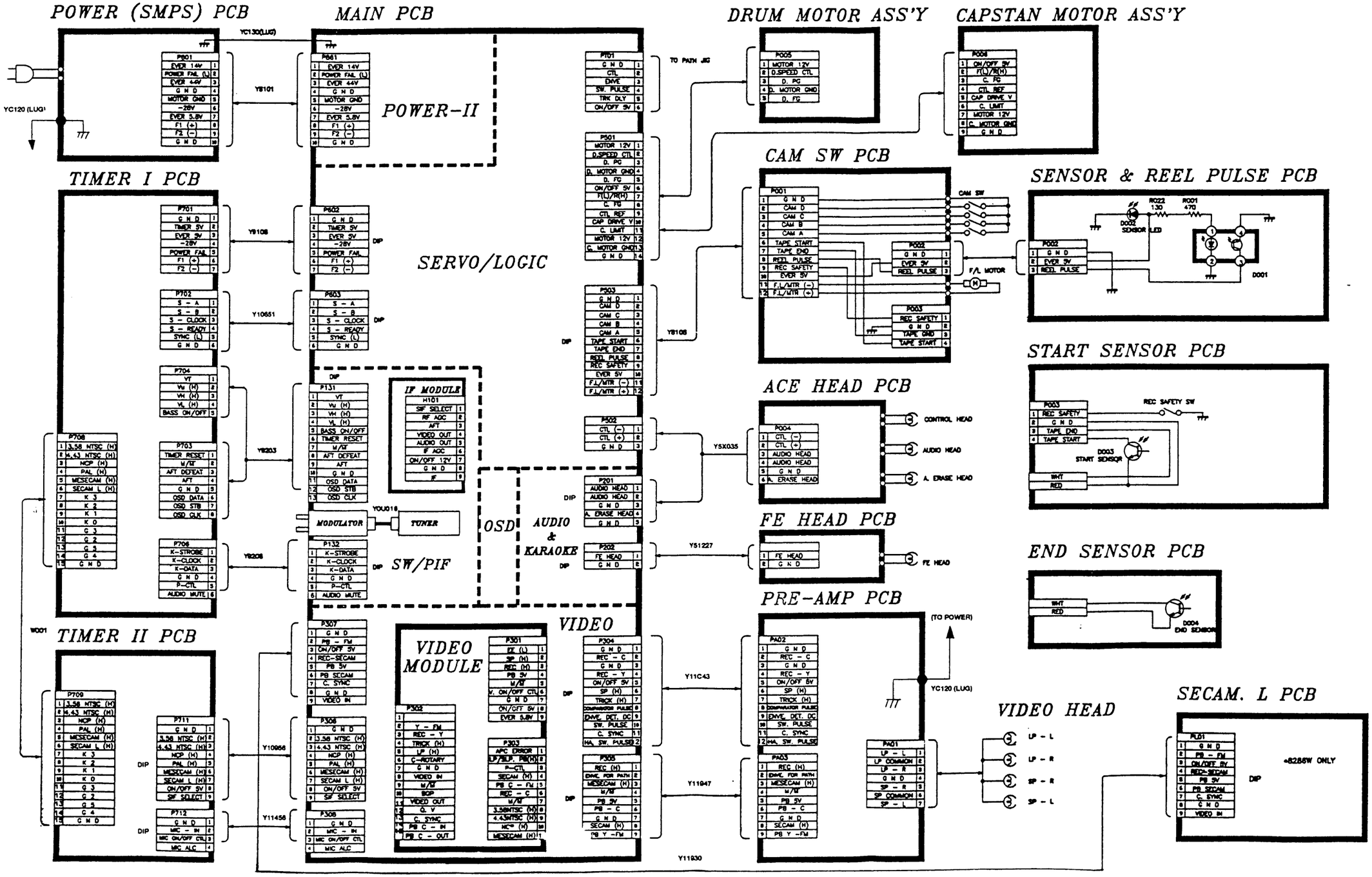
PIN NO	PB	REC	REMARK
1	0	5.0	In case of CH switch etc, output terminal of Audio Mute which is supplied to PIF circuit.
2	0	0	KARAOKE DATA for the use of KARAOKE function.
3	0	0	KARAOKE CLOCK for the use of KARAOKE function.
4	0	0	KARAOKE STROBE for the use of KARAOKE function.
5	0.0~5.0	0.0~5.0	SERIAL-CLOCK terminal in order to communicate syscon and data.
6	0.0~5.0	0.0~5.0	SERIAL-CLOCK terminal.
7	0.0~5.0	0.0~5.0	SERIAL-OUTPUT terminal.
8	0	0.0~5.0	SERIAL-INPUT termnal.
9	0.0~5.0	5.0	Terminal which connects the input of SYNC detector.
10	0.0~5.0	5.0	OSD CLOCK terminal in order to control OSD IC.
11	0	0.0~5.0	OSD DATA terminal in order to control OSD IC.
12	0	0	
13	0	0	
14	0	0	
15	0	0	
16	-0.2~0.2	0	
17	0	-0.2~0.2	Terminal which outputs PWM DATA for the use of sharpness cosntrol.
18	0	0.0~5.0	Terminal which outputs PWM DATA for the use of VT voltage-control of tuner.
19	0	0.0~5.0	
20	5.0	0	OSD STROBE terminal in order to control OSD IC.
21	0	5.1	
22	0	0	
23	0	0	Output terminal of AFT defeat in order to control AFT operation of tuner.
24	0.4	0	Output terminal of NTSC (H)/PAL (L) in order to control NTSC and PAL.
25	5.1	0.4	Terminal which inputs the received DATA by the remote control unit.
26	5.1	5.1	Input terminal of the POWER FAIL (L) in order to check whether the POWER FAILURE is occurred.
27	5.1	5.1	In case of initial state, input terminal which supplies the signal of reset.
28	1.7 (2.5)	1.7 (2.0)	Terminal which connects the 32.7KHz X-TAL that becomes the standard CLOCK for the use of the power failure compensation.
29	2.4 (4.8)	2.4 (4.8)	Terminal which connects the 32.7KHz X-TAL that becomes the standard CLOCK for the use of the power failure compensation.
30	2.1 (4.0)	2.4 (4.0)	Terminal which connects the 4.19MHz X-TAL for the use of the system CLOCK in order to operate the timer μ-com.
31	2.5 (4.6)	2.5 (4.6)	Terminal which connects the 4.19MHz X-TAL for the use of the system CLOCK in order to operate the timer μ-com.
32	0	0	G.N.D
33	0	0	
34	0	0	
35	0	0	
36	0	0	

PIN NO	PB	REC	REMARK
37	0	0	Terminal which inputs the key DATA of the key MATRIX (K3)
38	0	0	Terminal which inputs the key DATA of the key MATRIX (K2)
39	0	0	Terminal which inputs the key DATA of the key MATRIX (K1)
40	0.0~4.5	0.0~4.5	Terminal which inputs the key DATA of the key MATRIX (K0)
41	-28.5~5.0	-28.5~5.0	Voltage output terminal (K) for SEG. control of digitron.
42	-28.5~5.0	-28.5~5.0	Voltage output terminal (J) for SEG. control of digitron.
43	-28.5~5.0	-28.5~5.0	Voltage output terminal (I) for SEG. control of digitron.
44	-28.5	-28.5~5.0	Voltage output terminal (H) for SEG. control of digitron.
45	-28.5~5.0	-28.5~5.0	Voltage output terminal (G) for SEG. control of digitron.
46	-28.5	-28.5~5.0	Voltage output terminal (F) for SEG. control of digitron.
47	-28.5	-28.5~5.0	Voltage output terminal (E) for SEG. control of digitron.
48	-28.5~5.0	-28.5~5.0	Voltage output terminal (D) for SEG. control of digitron.
49	-28.5	-28.5~5.0	Voltage output terminal (C) for SEG. control of digitron.
50	-28.5~5.0	-28.5~5.0	Voltage output terminal (B) for SEG. control of digitron.
51	-28.5~5.0	-28.5~5.0	Voltage output terminal (A) for SEG. control of digitron.
52	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G1)
53	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitro. and use as SCAN key (G2)
54	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G3)
55	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G4)
56	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G5)
57	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G6)
58	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G7)
59	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G8)
60	-28.5~5.0	-28.5~5.0	Voltage output terminal for GRID control of digitron and use as SCAN key (G9)
61	-28.5	-28.5	
62	-28.5	-28.5	
63	-28.5	-28.5	
64	-28.5	-28.5	
65	0	0	
66	0	0	
67	0	0	
68	0	0	
69	-2.0~0	-2.0~0.0	Output terminal of ON/OFF the bass control of KARAOKE function.
70	5.1	5.1	Output terminal for controlling the V-LOW BAND of tuner.

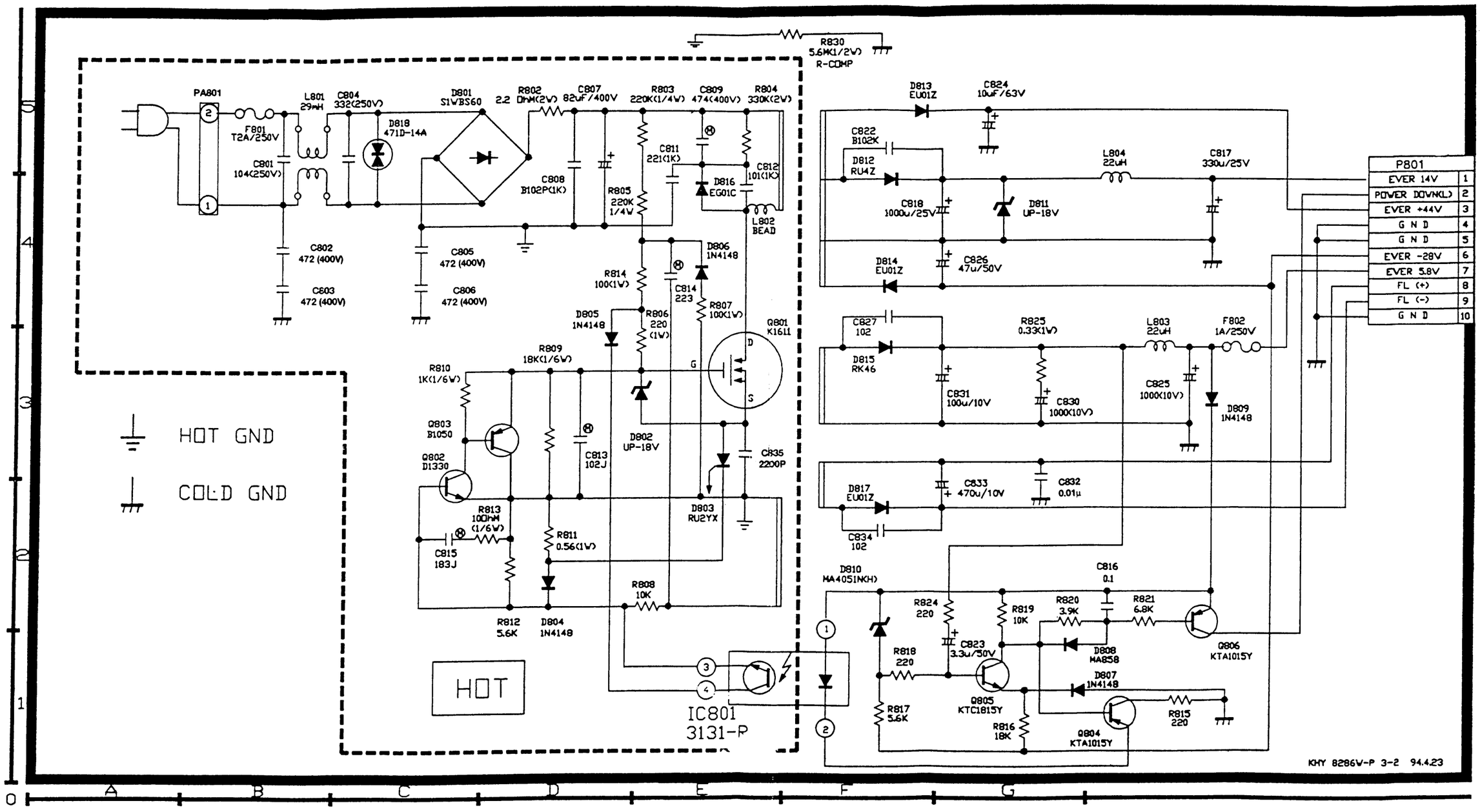
PIN NO	PB	REC	REMARK
71	0	0	Output terminal for controlling the V-HIGH BAND of tuner.
72	0	0	Output terminal for controlling the UHF BAND of tuner.
73	5.1	5.1	Terminal which supplies the power for the use of operation of timer μ-com.
74	-28.0	-28.0	Terminal which supplies -28V in order to make digitron ON/OFF.
75	0	0	Ground terminal of the timer μ-com.
76	5.1	5.1	Input terminal of the standard-voltage in order to compare with the AFT voltage.
77	0	0	Output terminal of EEPROM STROBE.
78	0	0	Output terminal of EEPROM CLOCK.
79	5.1	5.1	I/O terminal of EEPROM DATA.
80	2.4	2.4	AFT curve control port.

SECTION 6. CIRCUIT DIAGRAM

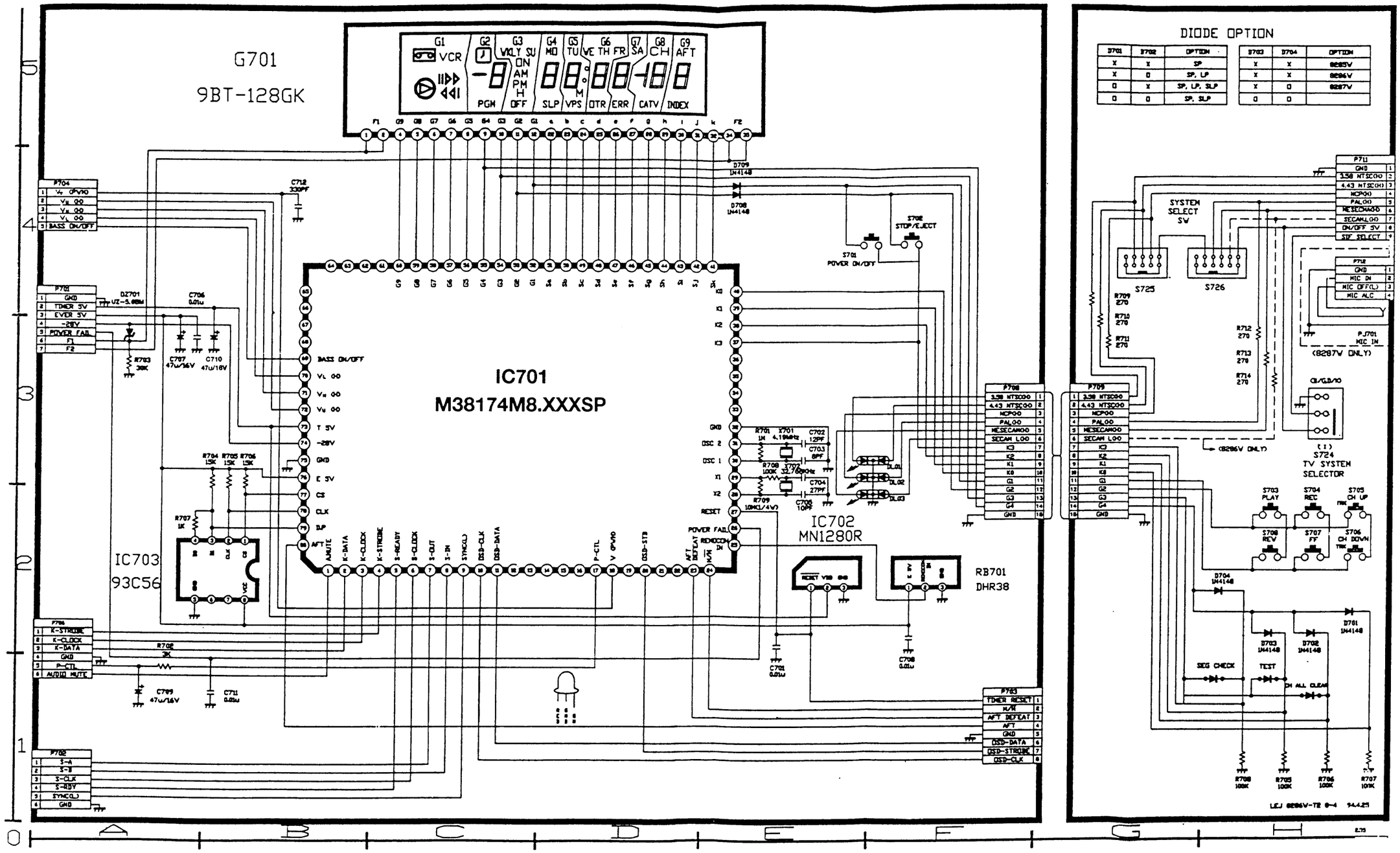
6-1. OVERALL CONNECTION DIAGRAM



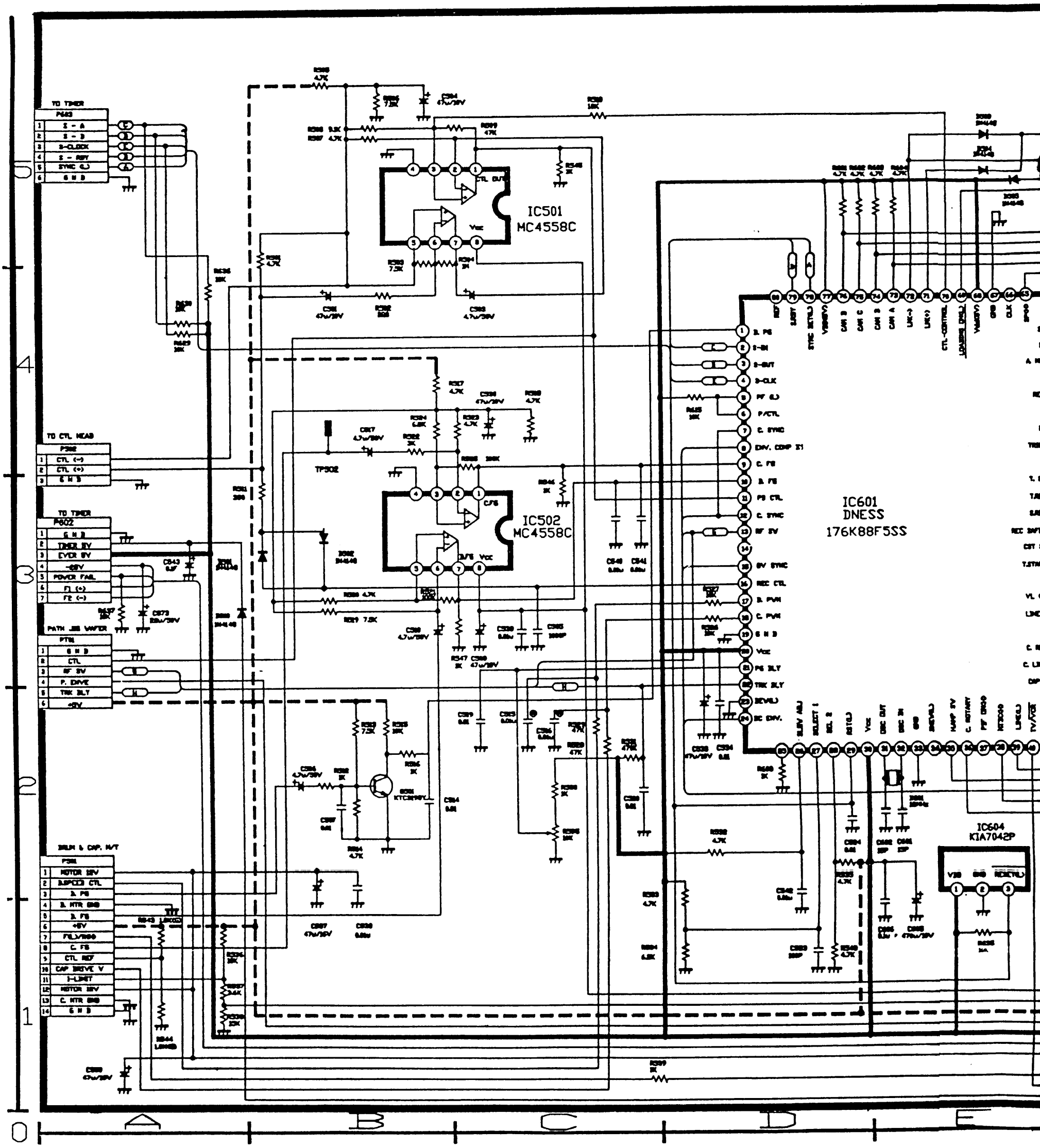
6-2. POWER SUPPLY SCHEMATIC DIAGRAM

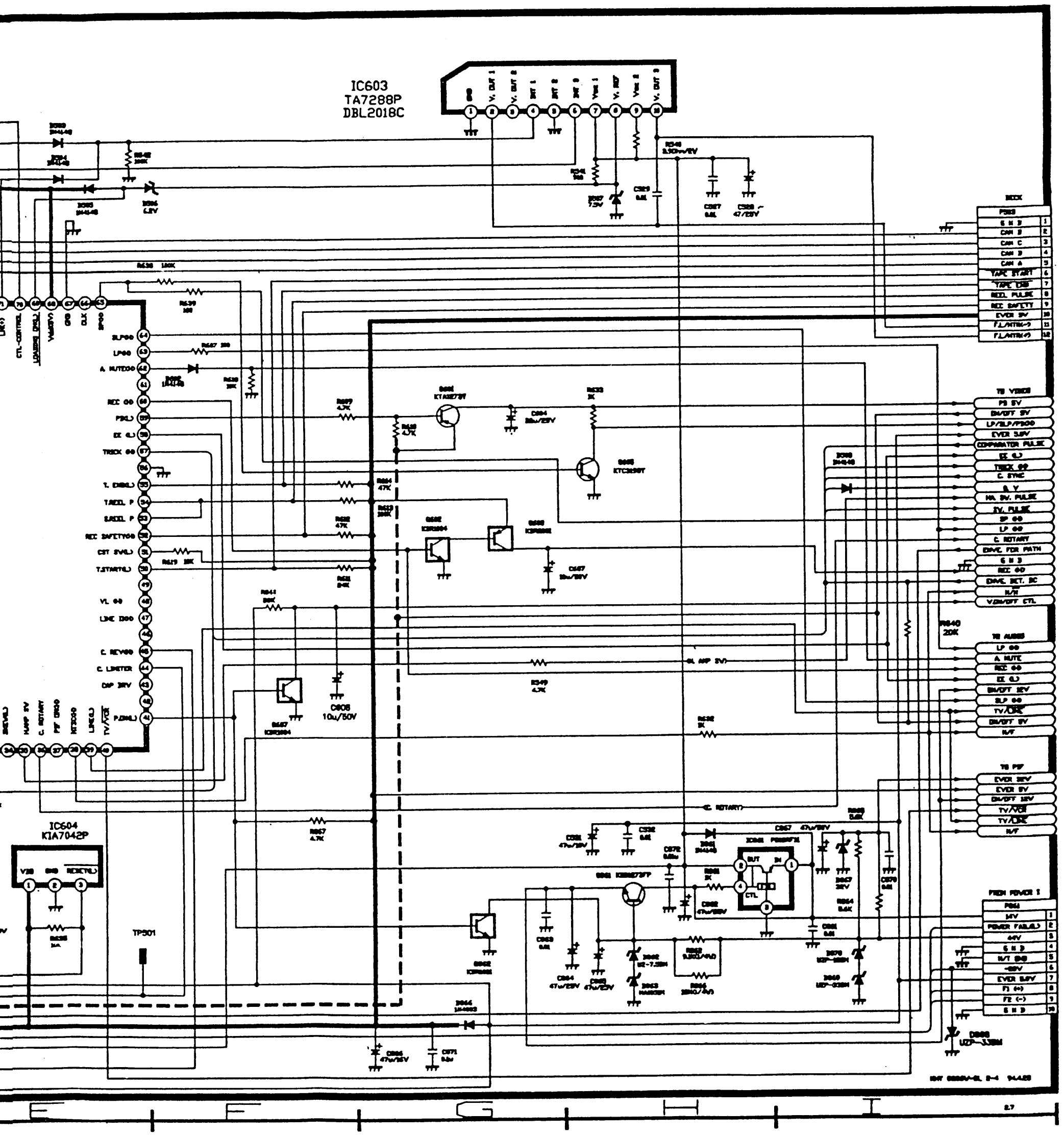


6-3. TIMER CIRCUIT

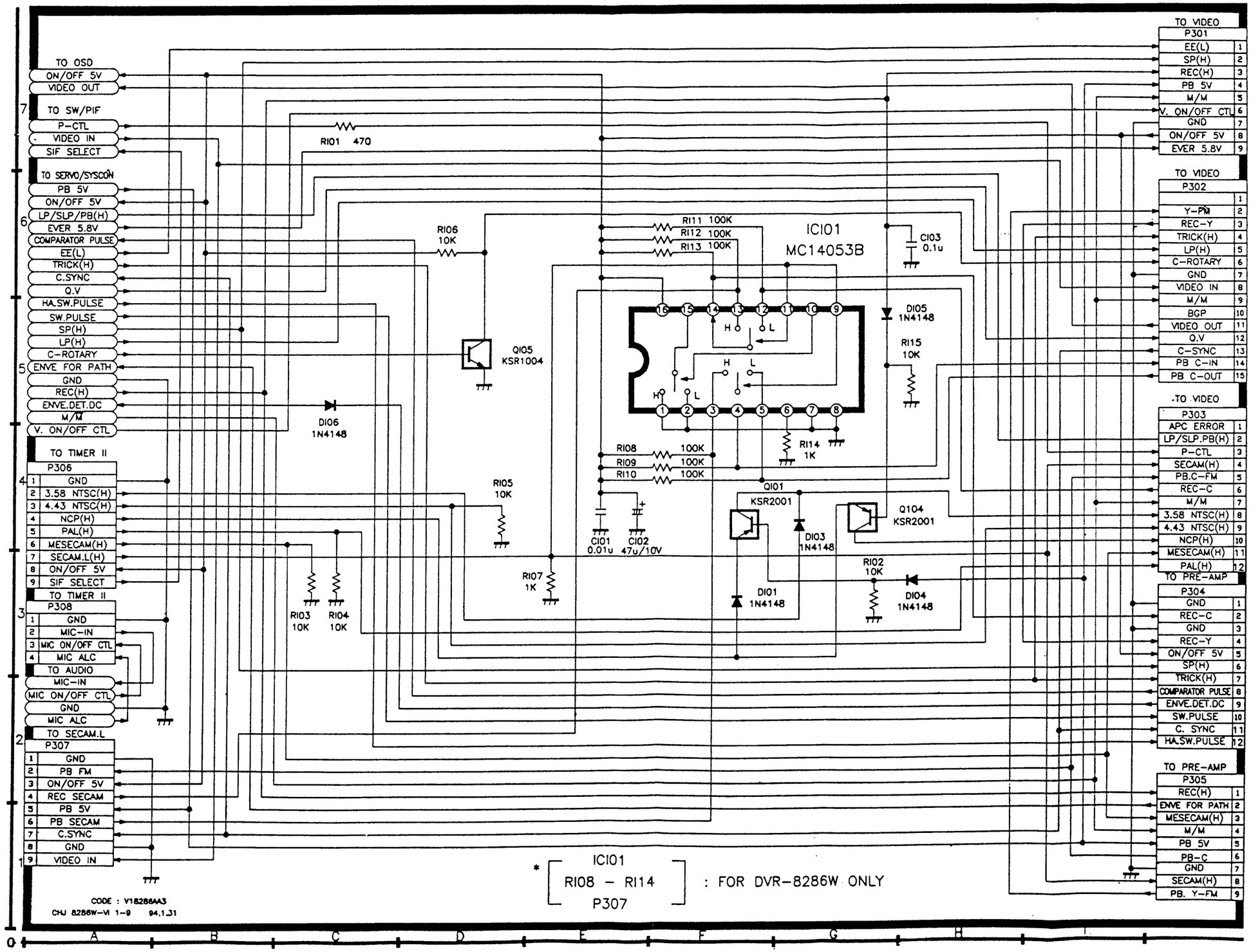


6-4. SERVO LOGIC CIRCUIT

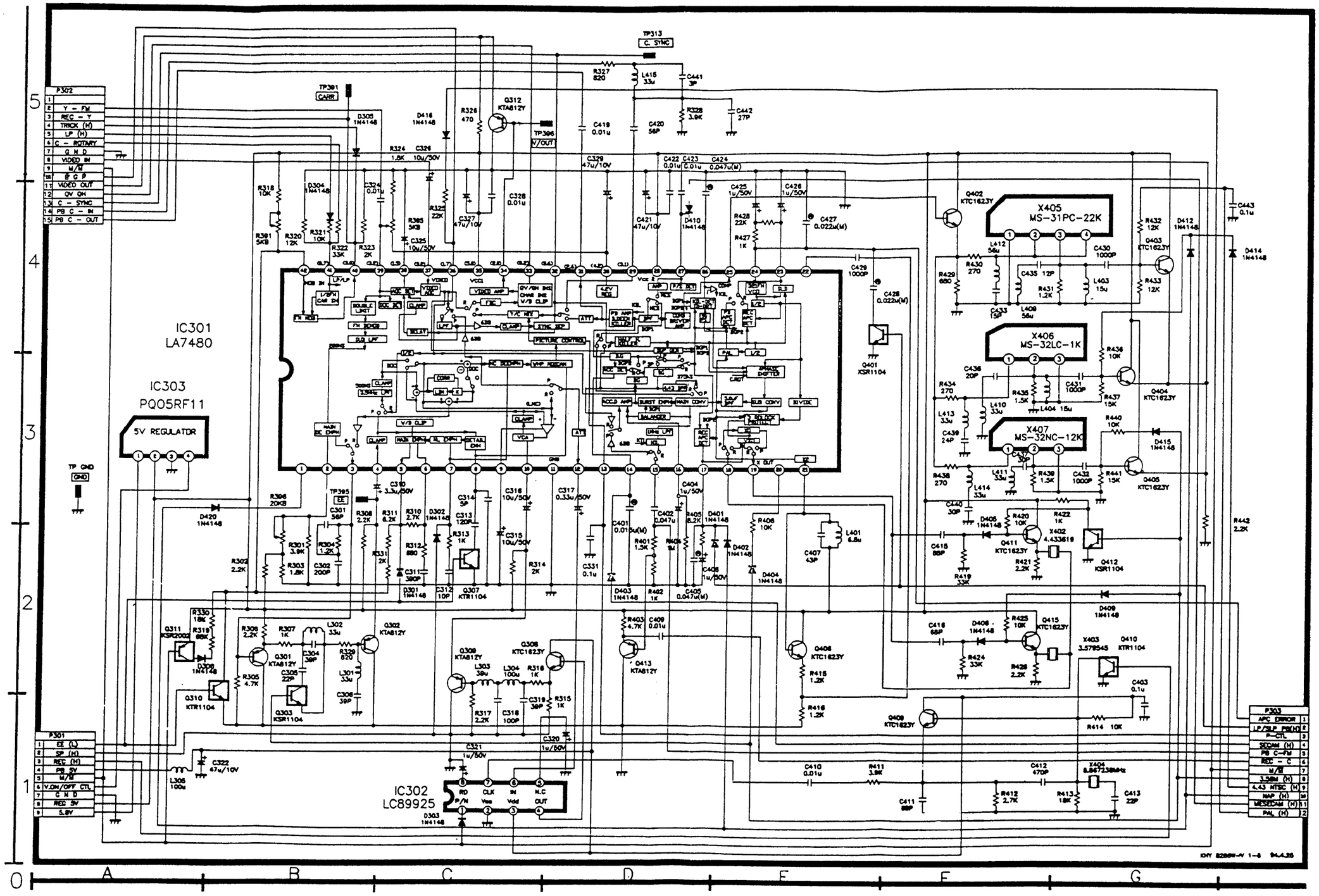



IC603
TA7288P
DBL2018C
IC604
KIA7042P
TP501
TO VIDEO
TO AUDIO
TO PIF
FROM POWER S
R640
20K

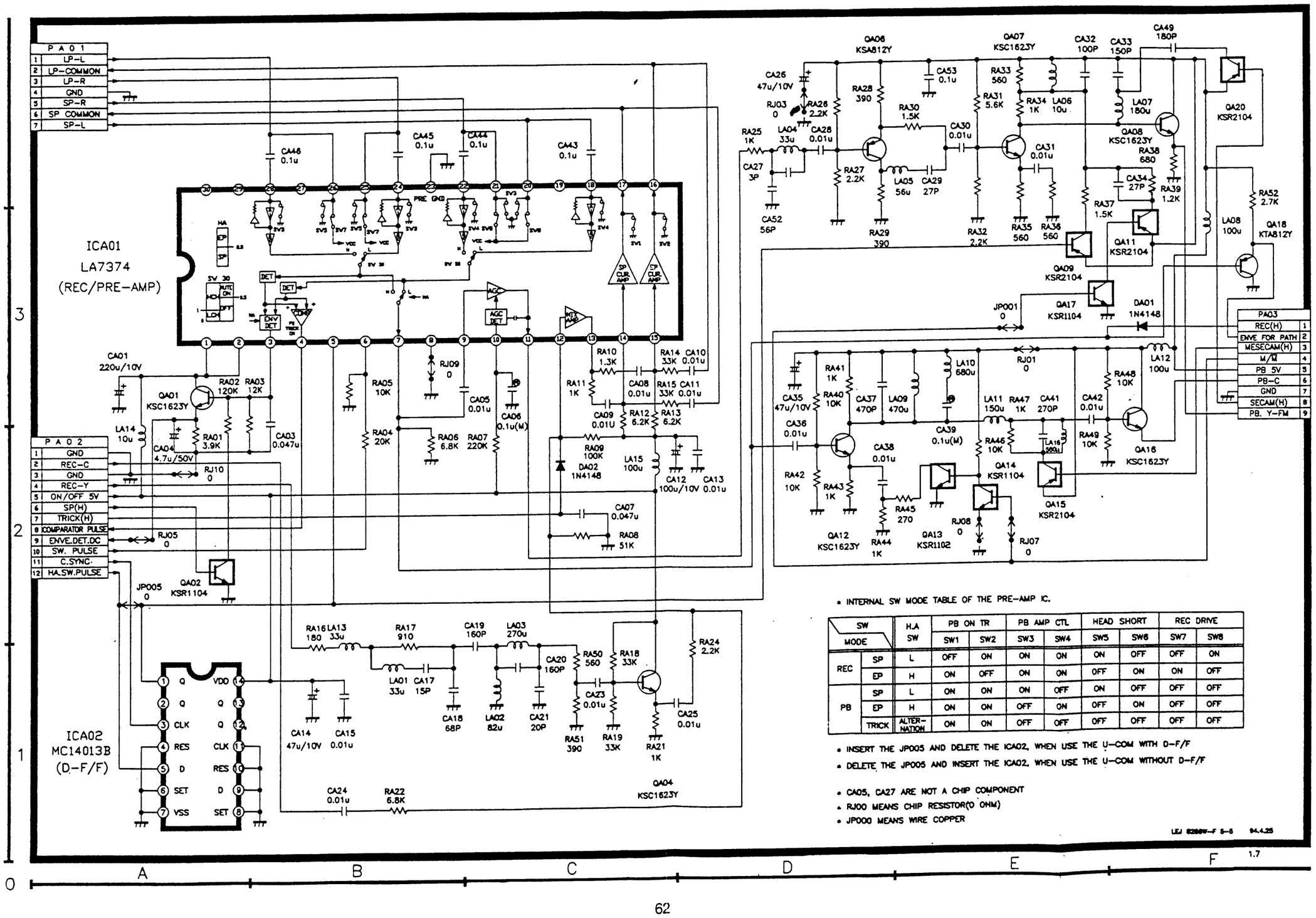
6-5. VIDEO INTERFACE CIRCUIT



6-6. MULTI SYSTEM VIDEO CIRCUIT



6-7. PRE-AMP CIRCUIT FOR MULTI-SYSTEM



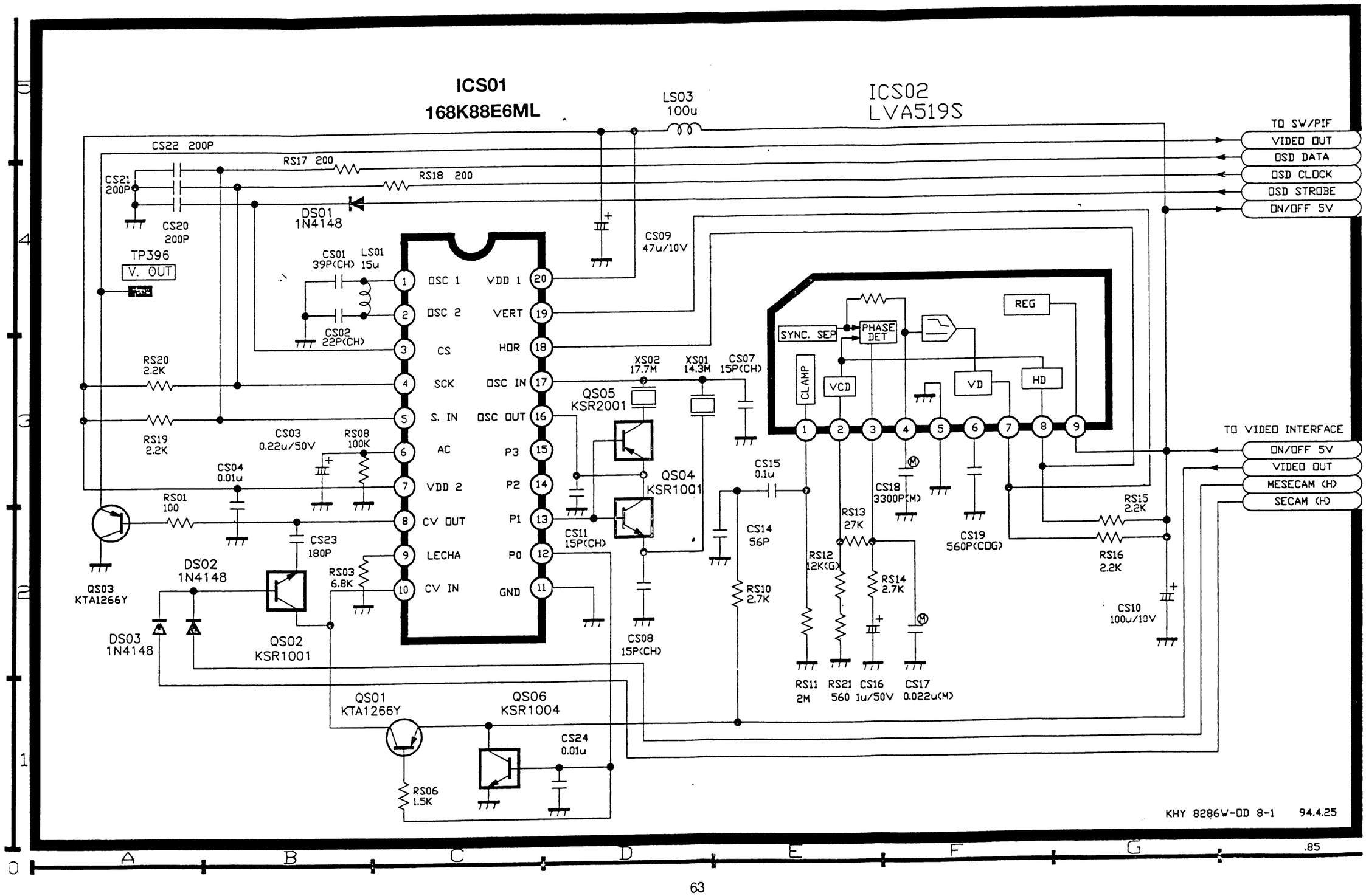
- INTERNAL SW MODE TABLE OF THE PRE-AMP IC.

SW / MODE		H.A SW	PB ON TR		PB AMP CTL		HEAD SHORT		REC DRIVE	
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
REC	SP	L	OFF	ON	ON	ON	ON	OFF	OFF	ON
	EP	H	ON	OFF	ON	ON	OFF	ON	ON	OFF
PB	SP	L	ON	ON	ON	OFF	ON	OFF	OFF	OFF
	EP	H	ON	ON	OFF	ON	OFF	ON	OFF	OFF
	TRICK	ALTER-NATION	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF

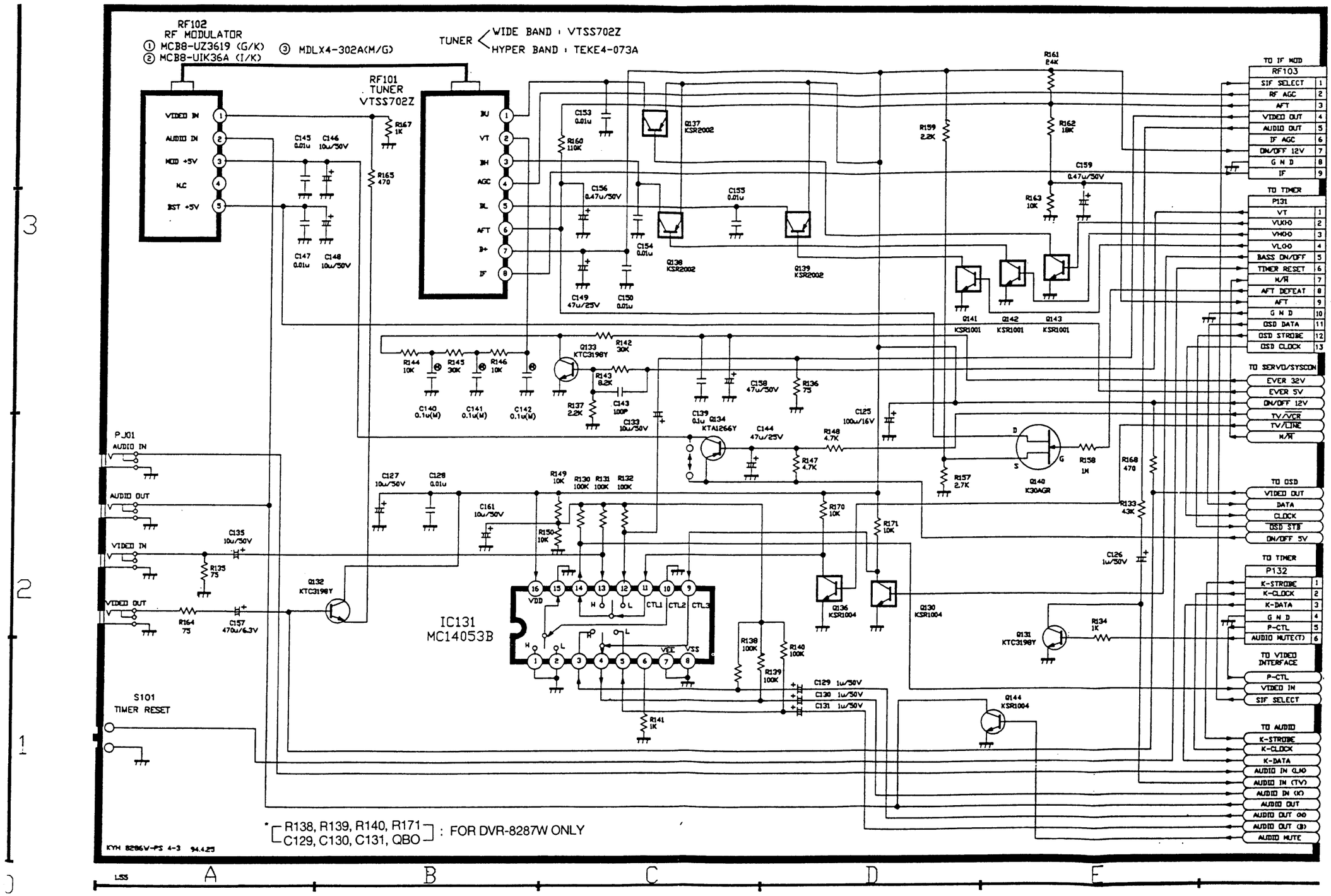
- INSERT THE JP005 AND DELETE THE ICA02, WHEN USE THE U-COM WITH D-F/F
- DELETE THE JP005 AND INSERT THE ICA02, WHEN USE THE U-COM WITHOUT D-F/F
- CA05, CA27 ARE NOT A CHIP COMPONENT
- RJ00 MEANS CHIP RESISTOR(0 OHM)
- JP000 MEANS WIRE COPPER

LEJ 62B8W-F 5-6 94.4.25

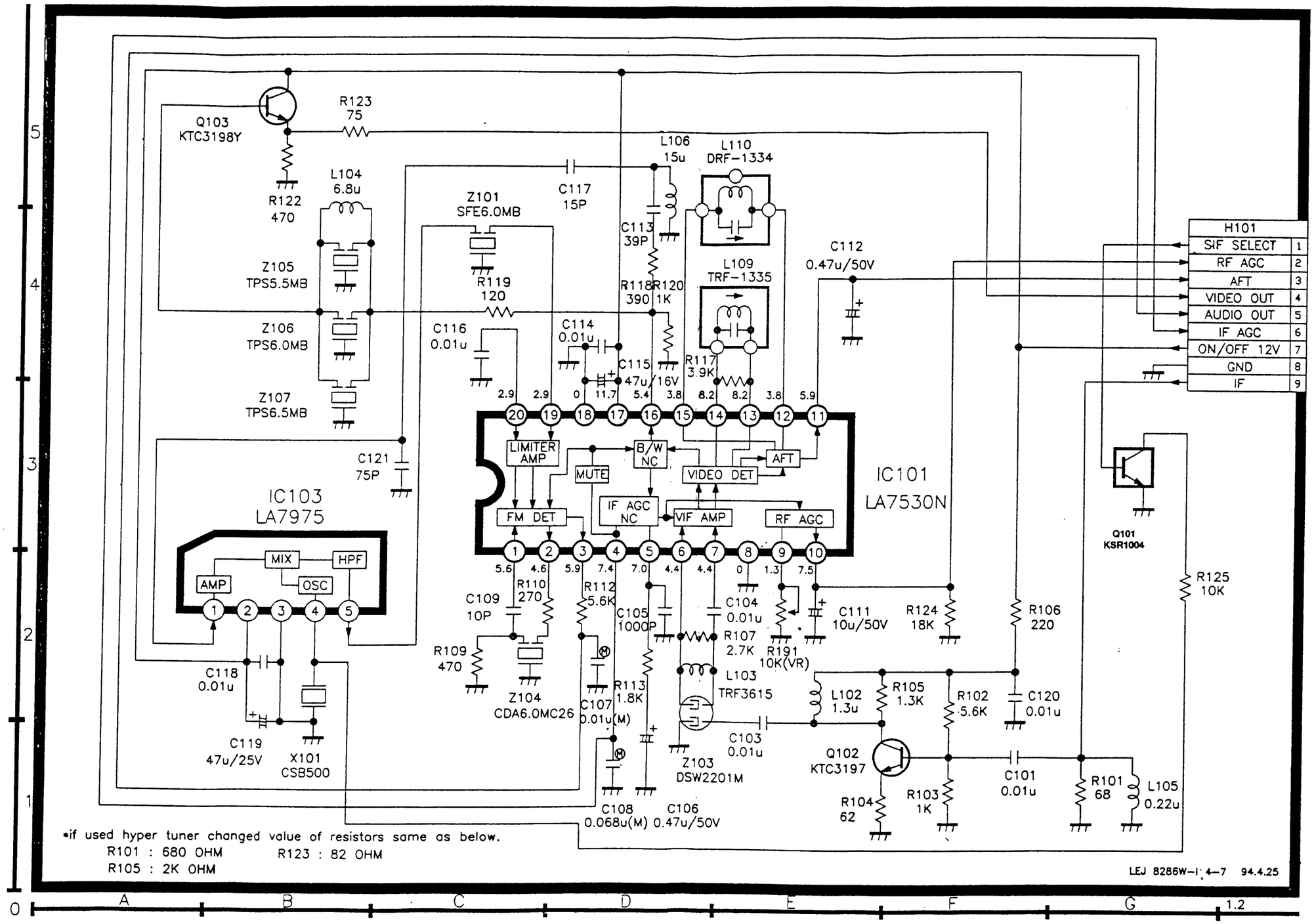
6-8. OSD CIRCUIT



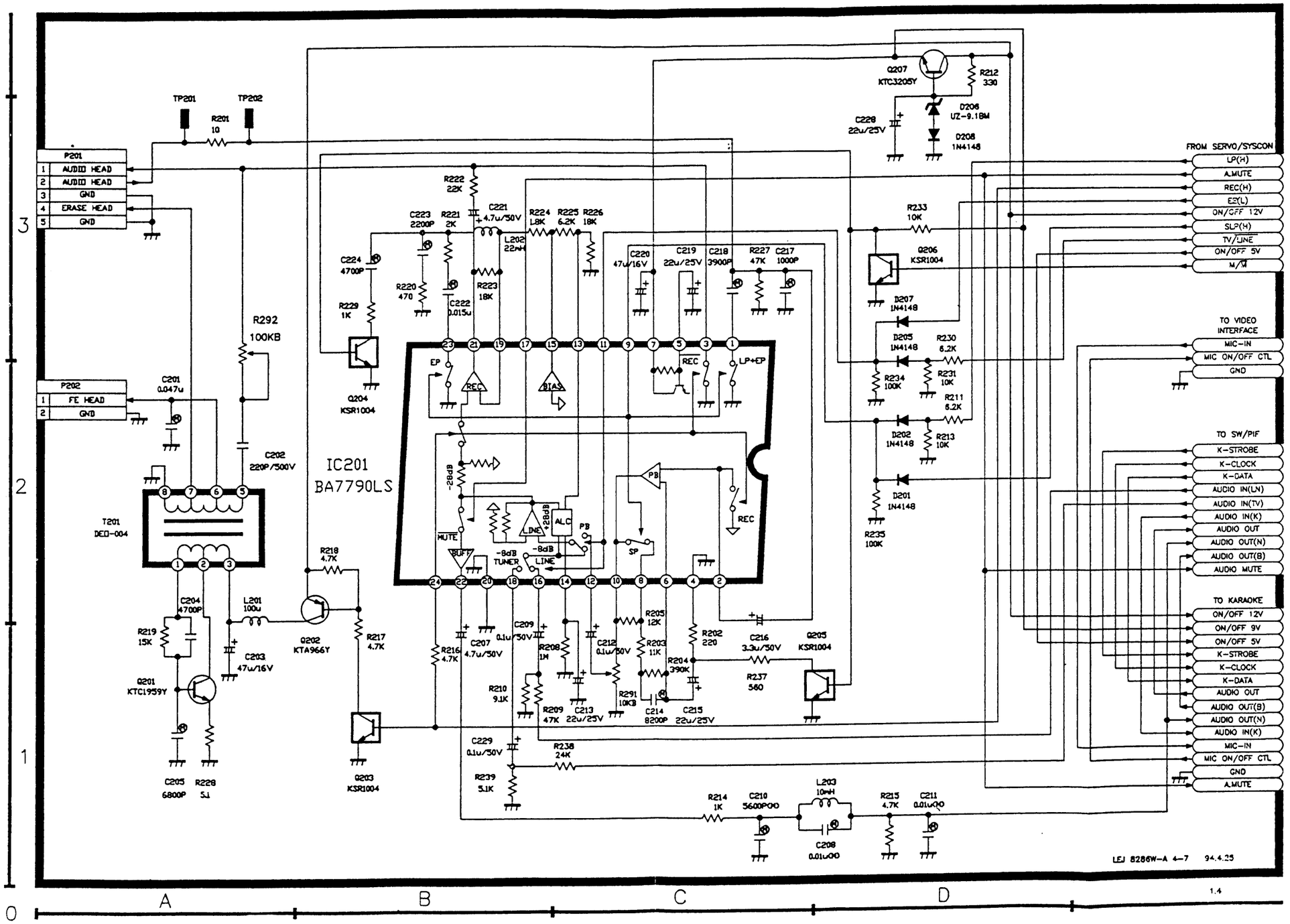
6-9. SW/PIF CIRCUIT



6-10. IF MODULE CIRCUIT

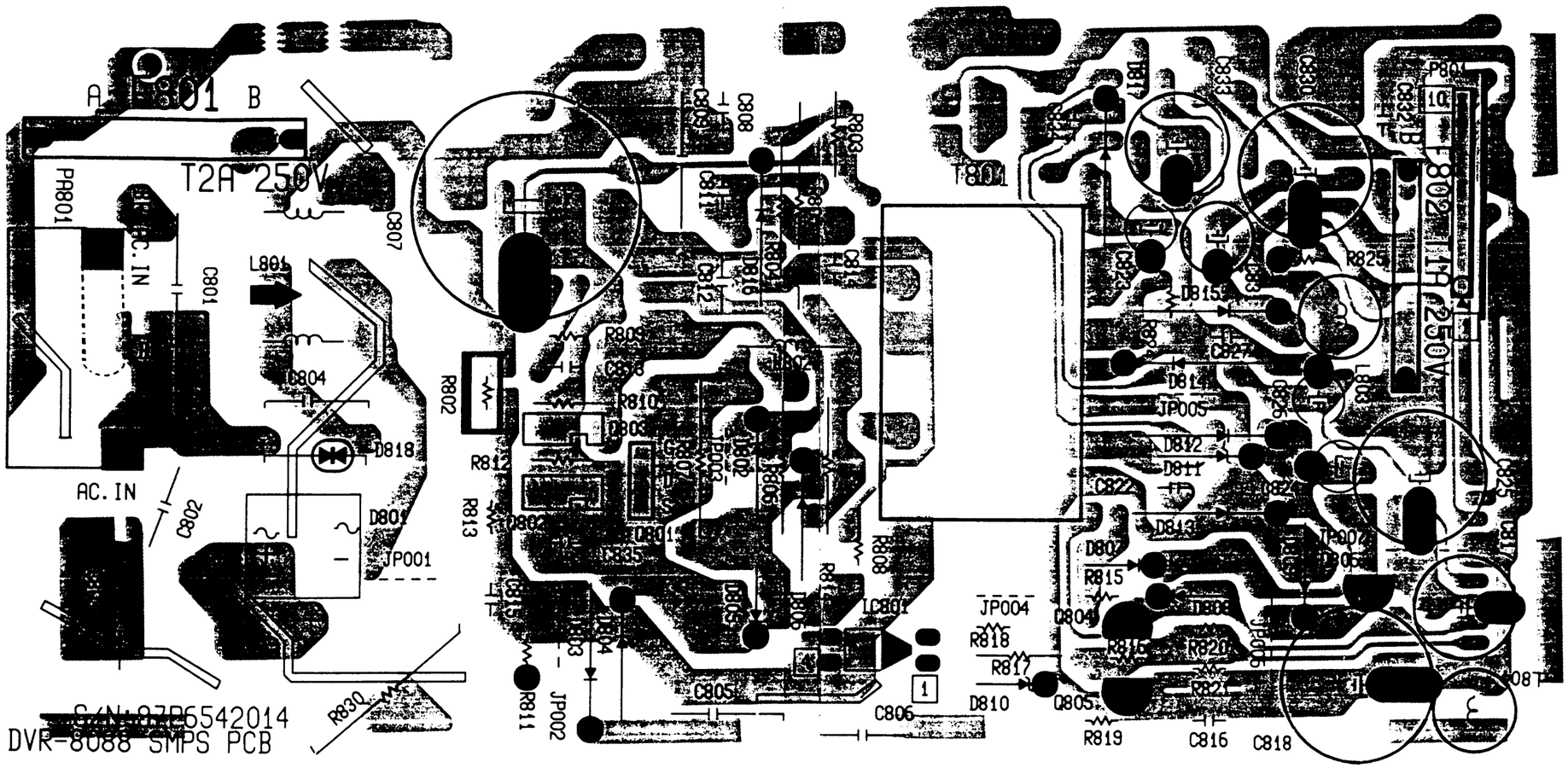


6-11. AUDIO CIRCUIT

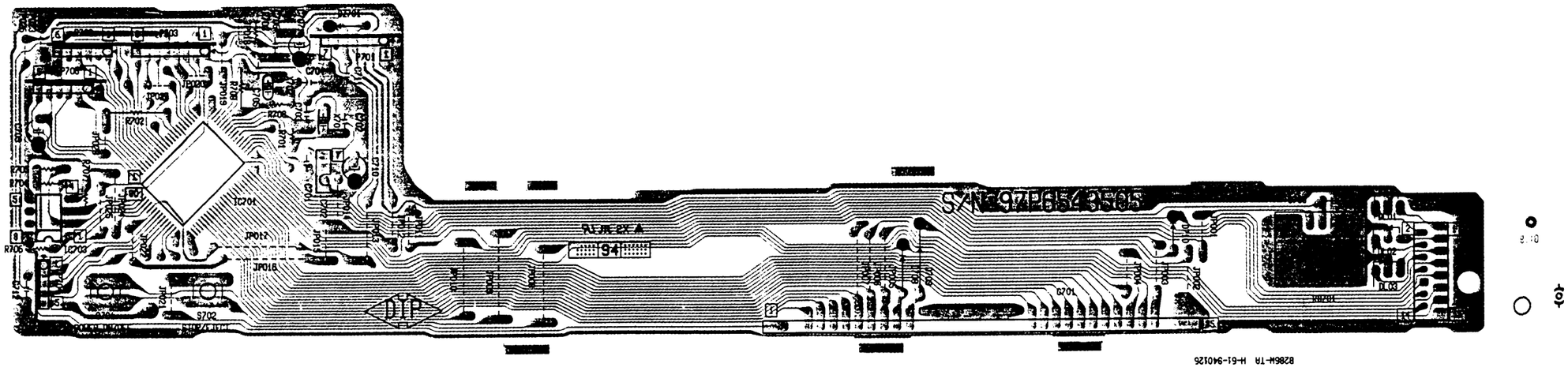


SECTION 7. COMPONENTS LOCATION GUIDE ON PCB (BOTTOM)

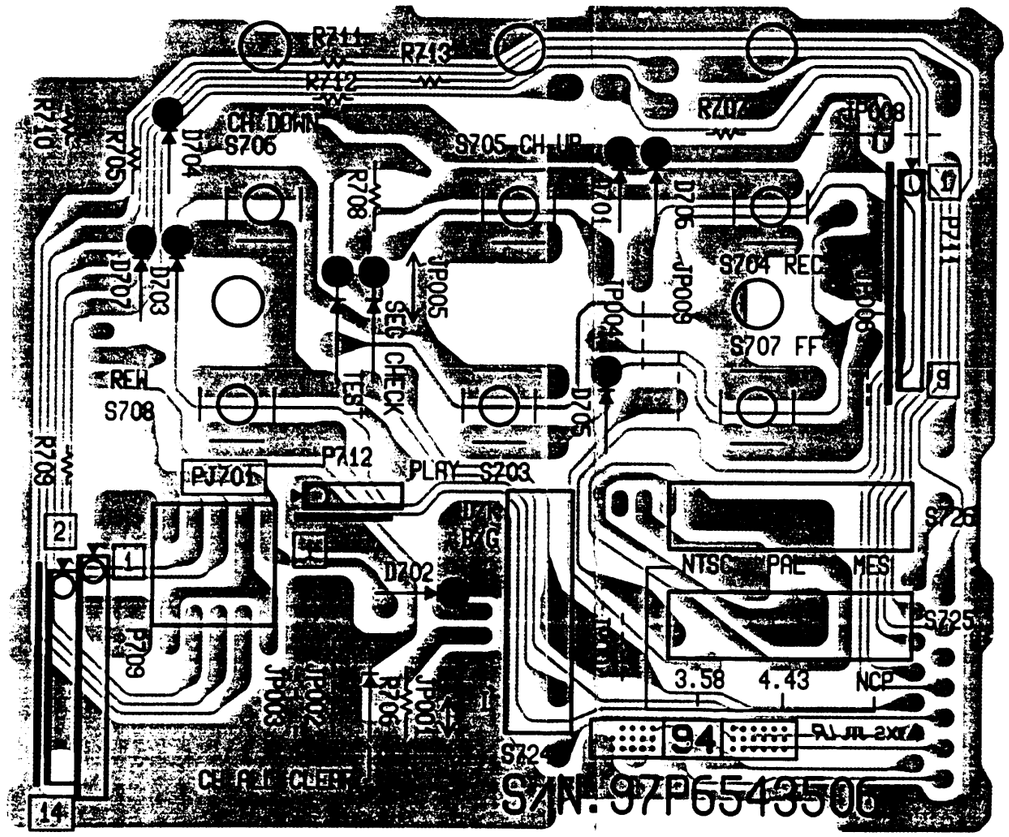
7-1. POWER PCB



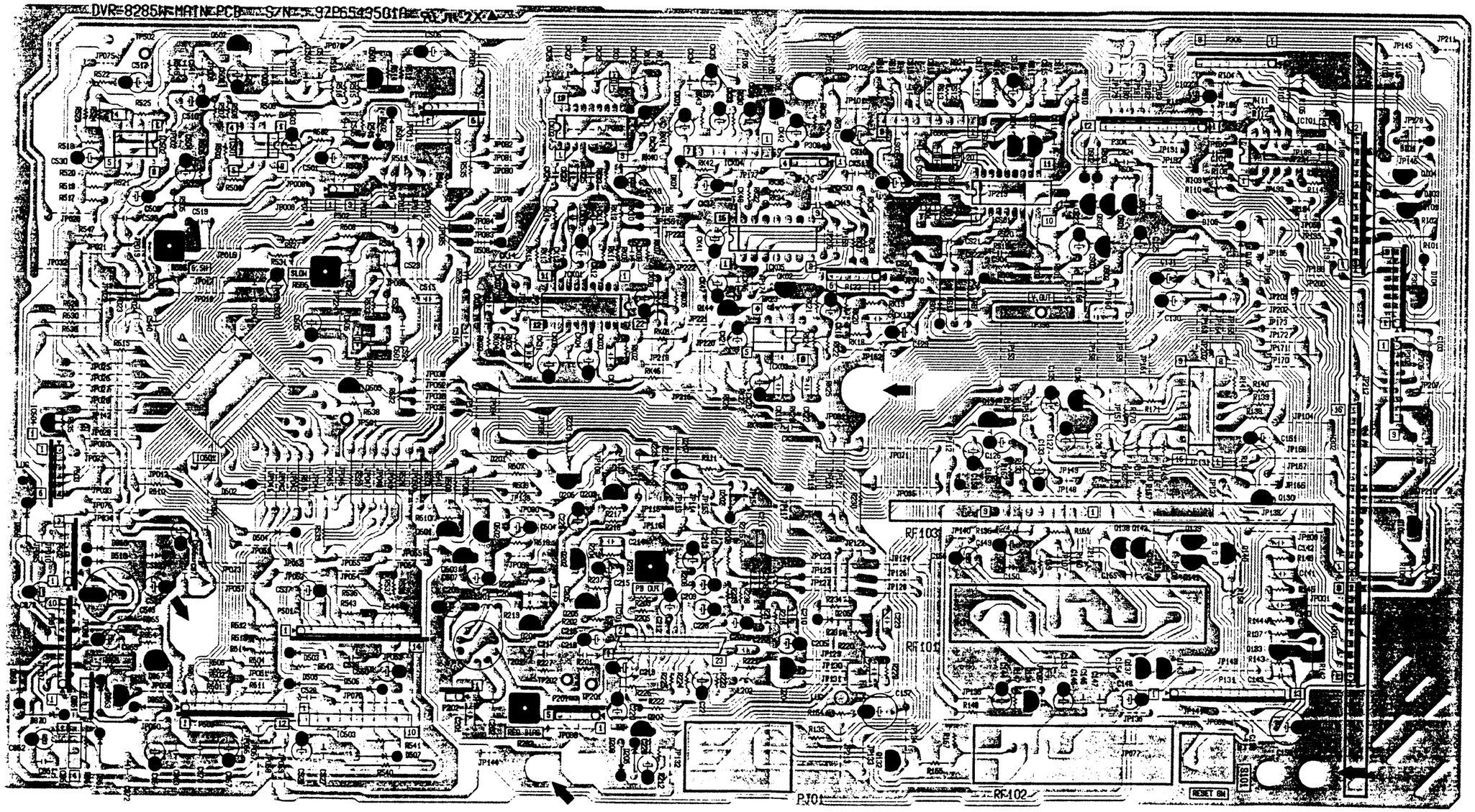
7-2. TIMER I PCB



7-3. TIMER II PCB



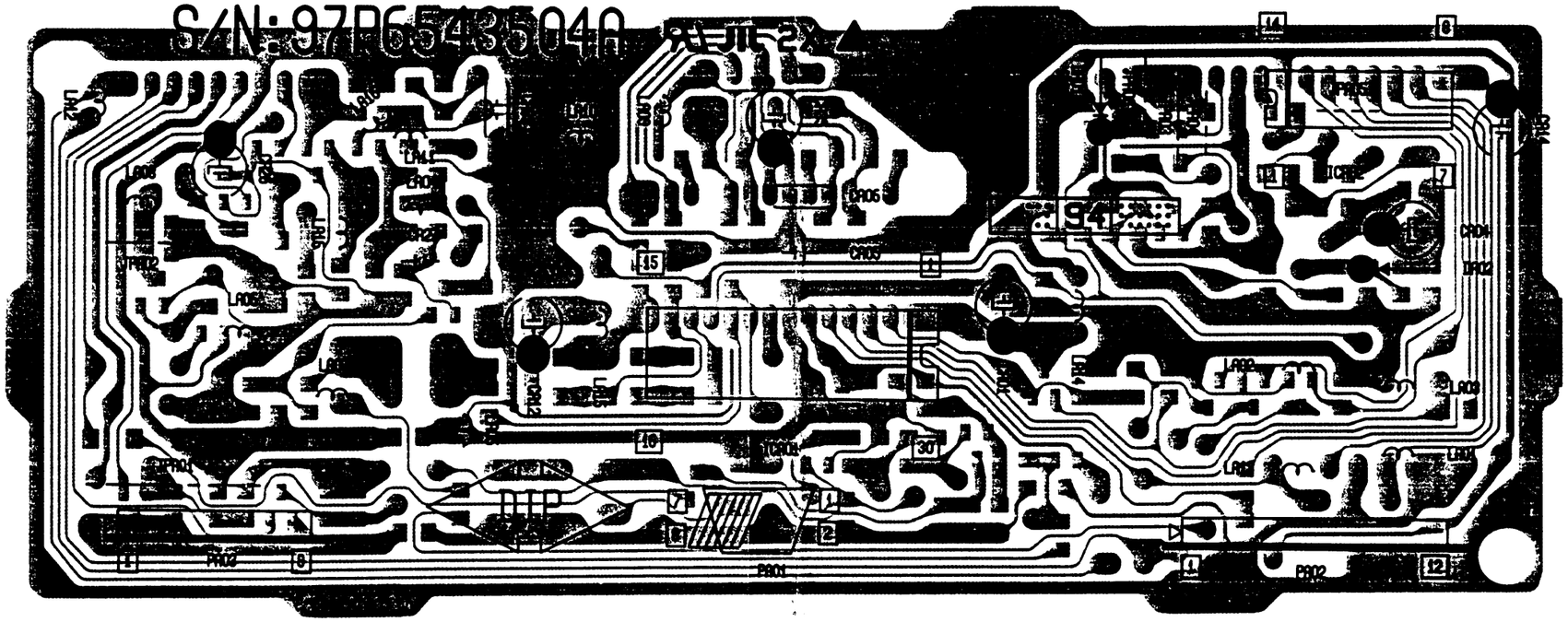
7-4. MAIN PCB



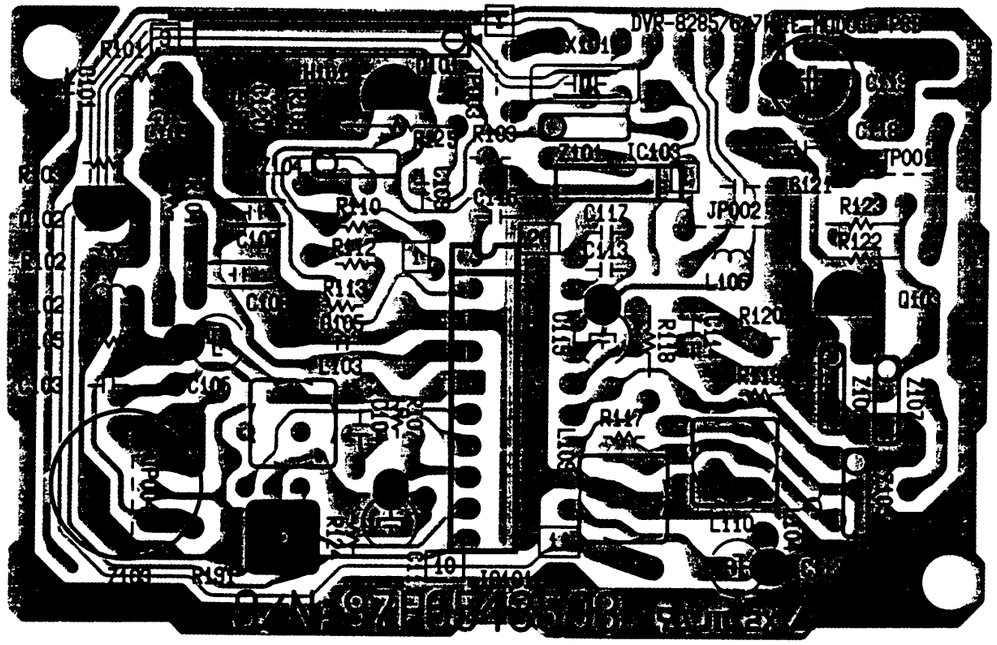
DIP

DVR-8285/6/7W MAIN PCB S/N : 97P6543501A

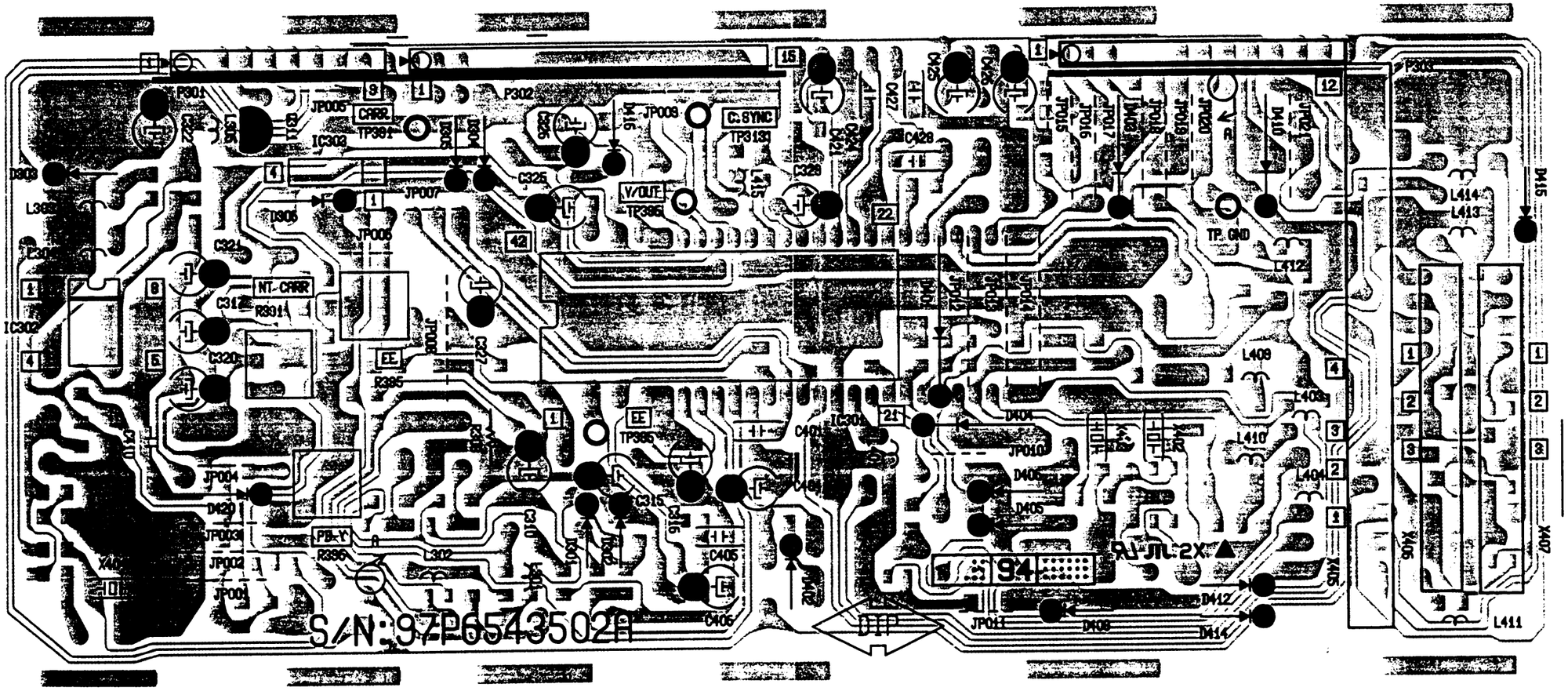
7-5. PRE-AMP PCB



7-6. PIF PCB



7-7. VIDEO PCB


P301
P302
P303
JP005
CARR
TP391
IC303
JP009
C.SYNC
TP313
JP007
JP006
V.OUT
TP395
C325
C326
C327
C328
C329
C425
C426
C427
C428
JP017
JP016
JP015
JP018
JP019
JP020
JP021
JP022
TP_GND
D410
L412
L414
L413
D415
C321
C322
NT-CARR
R391
C312
C320
R395
C323
TP386
C401
IC301
D404
JP010
D406
D405
L408
L410
L404
L405
L406
L407
L411
D412
D408
D414
JP011
JP004
D420
JP003
JP002
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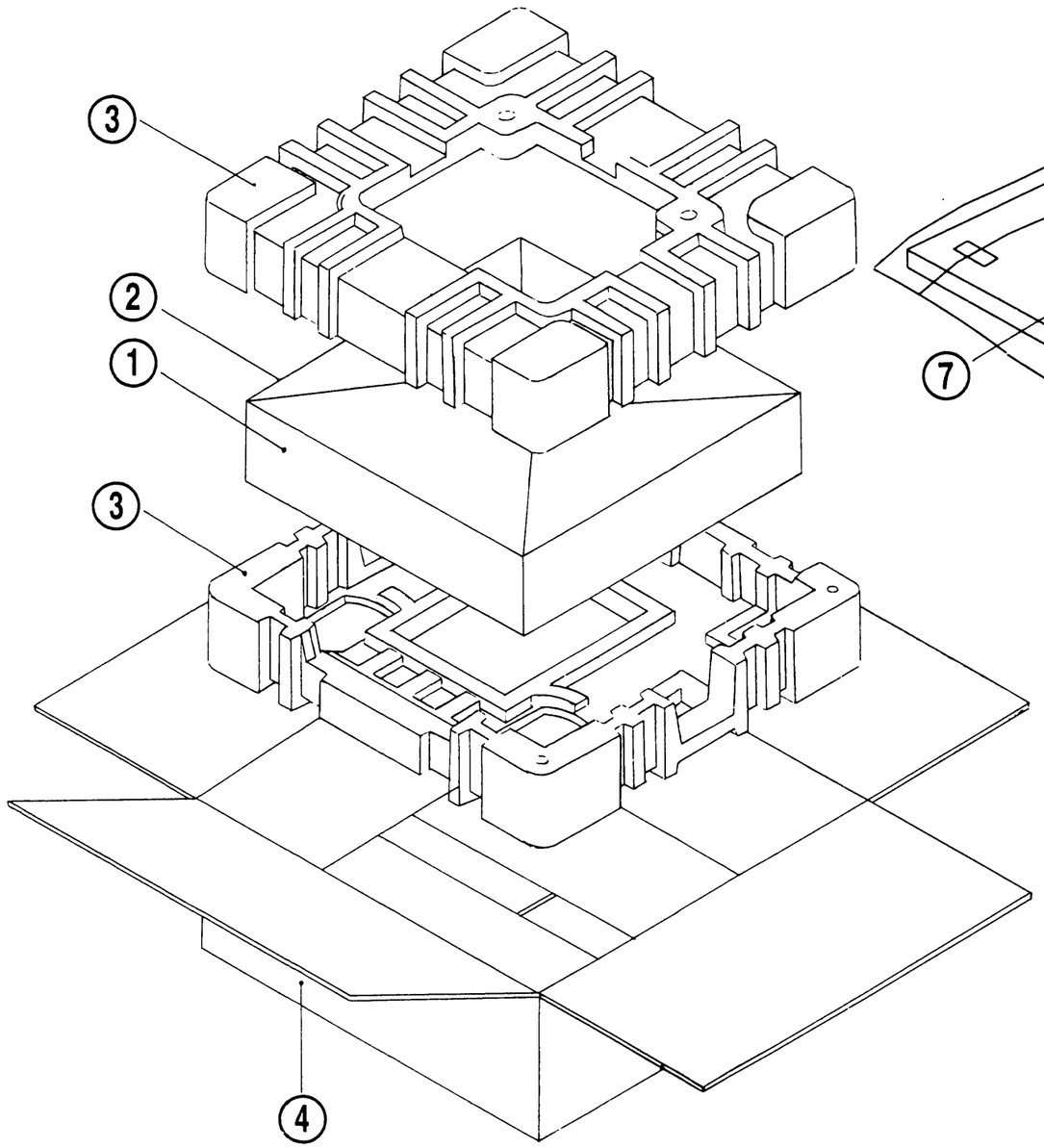
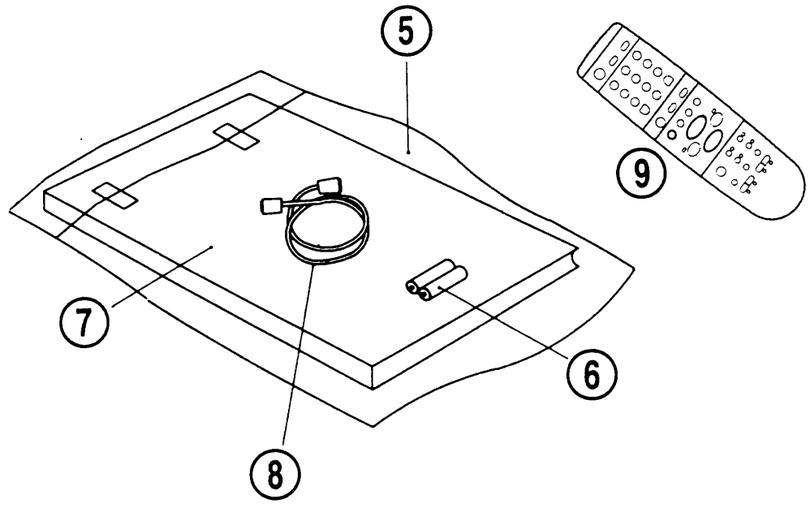
L302
C315
C316
C310
C405
C406
X401
X402
S/N:9ZP6543502H

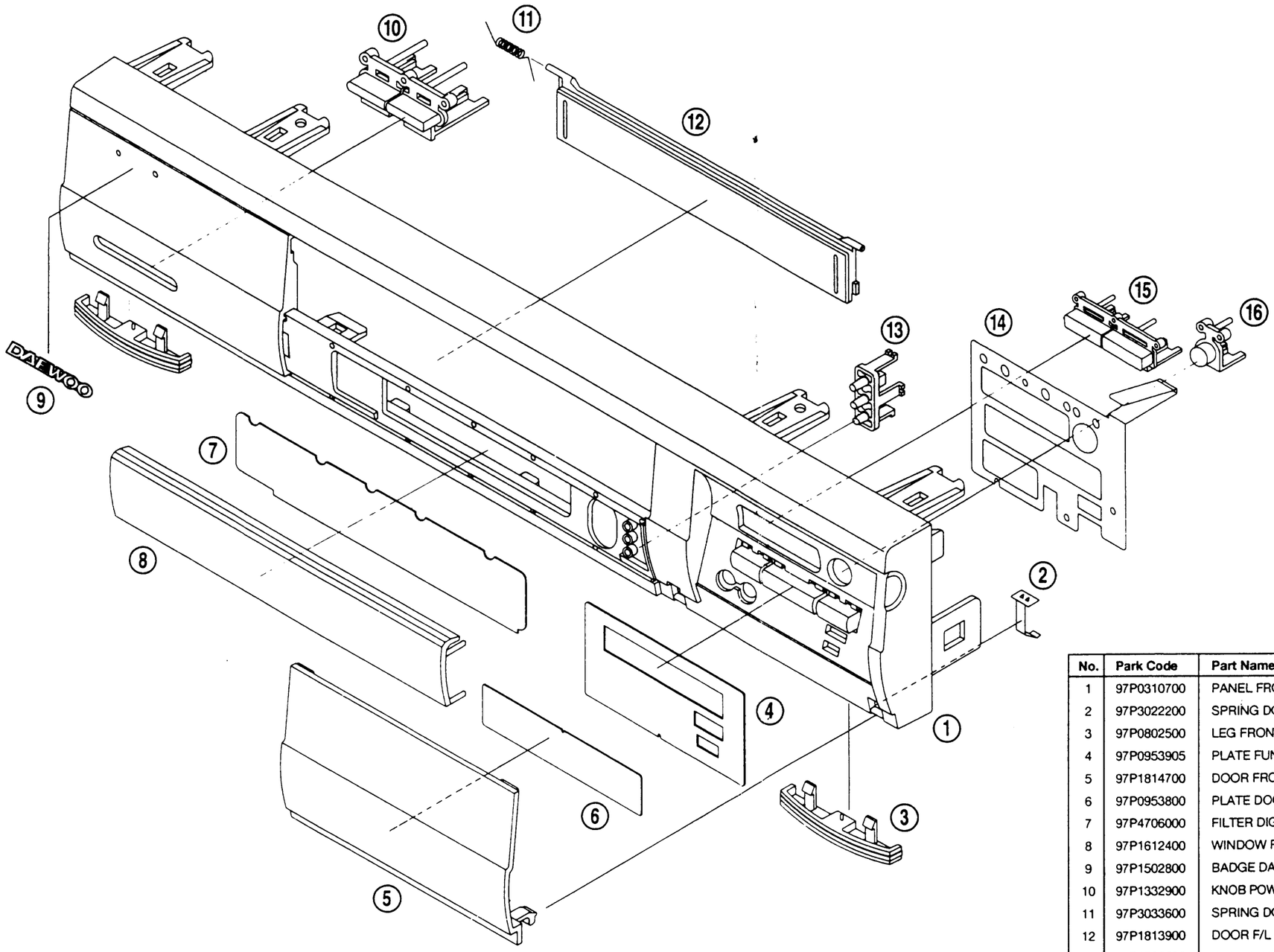




No.	Park Code	Part Name	Q'ty	Description	Remark
1	97PB0261S-	SET TOTAL AS	1		
2	97P4801300	POLY BAG FOR SET	1	PE-FORM	
3	97P4915800	PAD TOPBOTTOM	1	EPS	
4	97P5030100	BOX CARTON	1	EX3000xSCP150xEX300	
5	97P0424100	COVER ACCESSORY	1	LD-PE T0.1	
6	47P7500001	BATTERY	2	AAM 1.5V	
7	97P9530503	MANUAL OWNERS	1	ART PAPER	
8	97P8804212	CABLE CONNECOR	1	MP-504 (PAL-TYPE)	
9	97P1R80A02	REMOCON HANDSET AS	1	VR-480A	

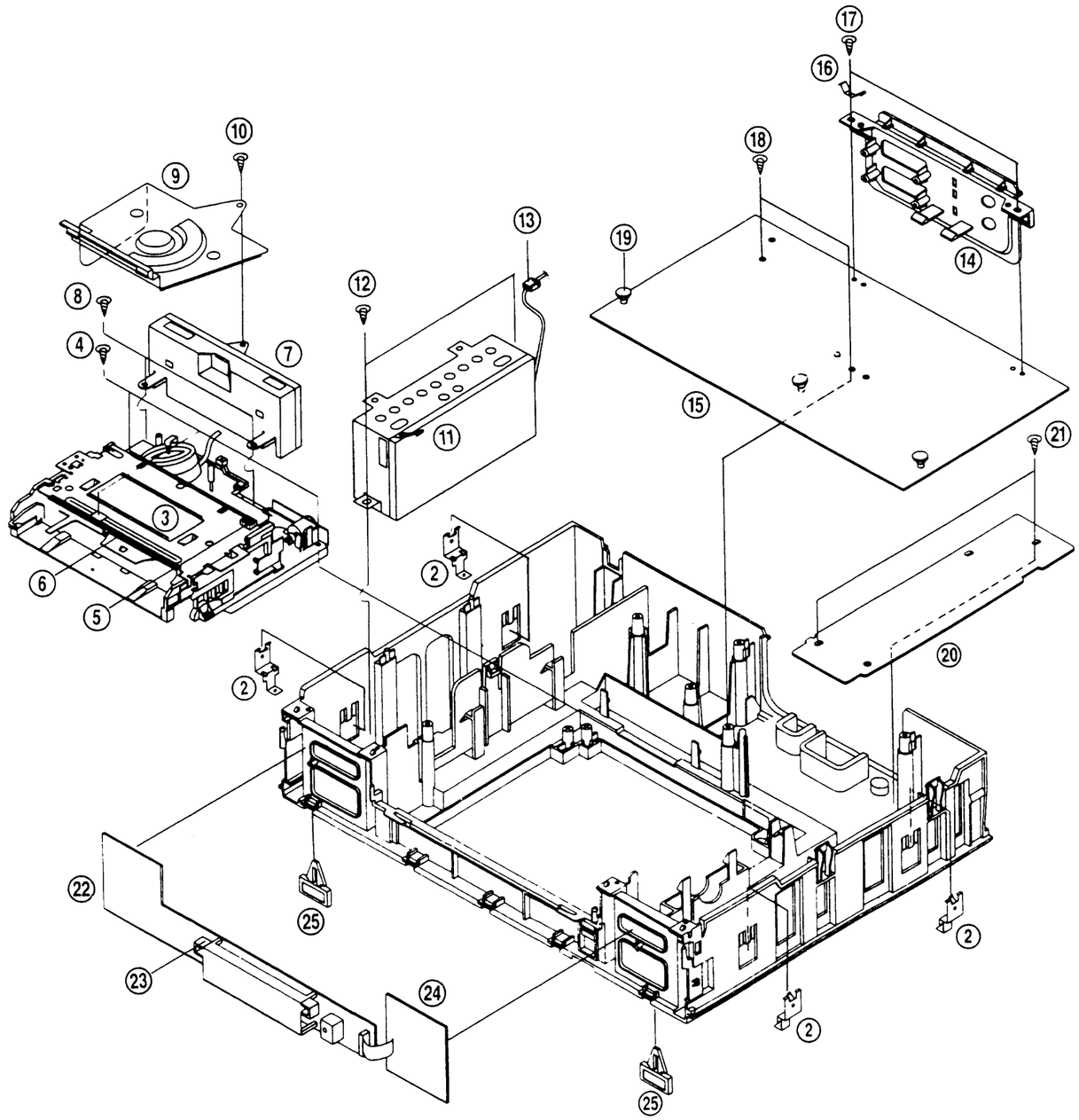
SECTION 9. EXPLODED VIEWS AND PART LIST

9-1. PANEL FRONT ASSEMBLY



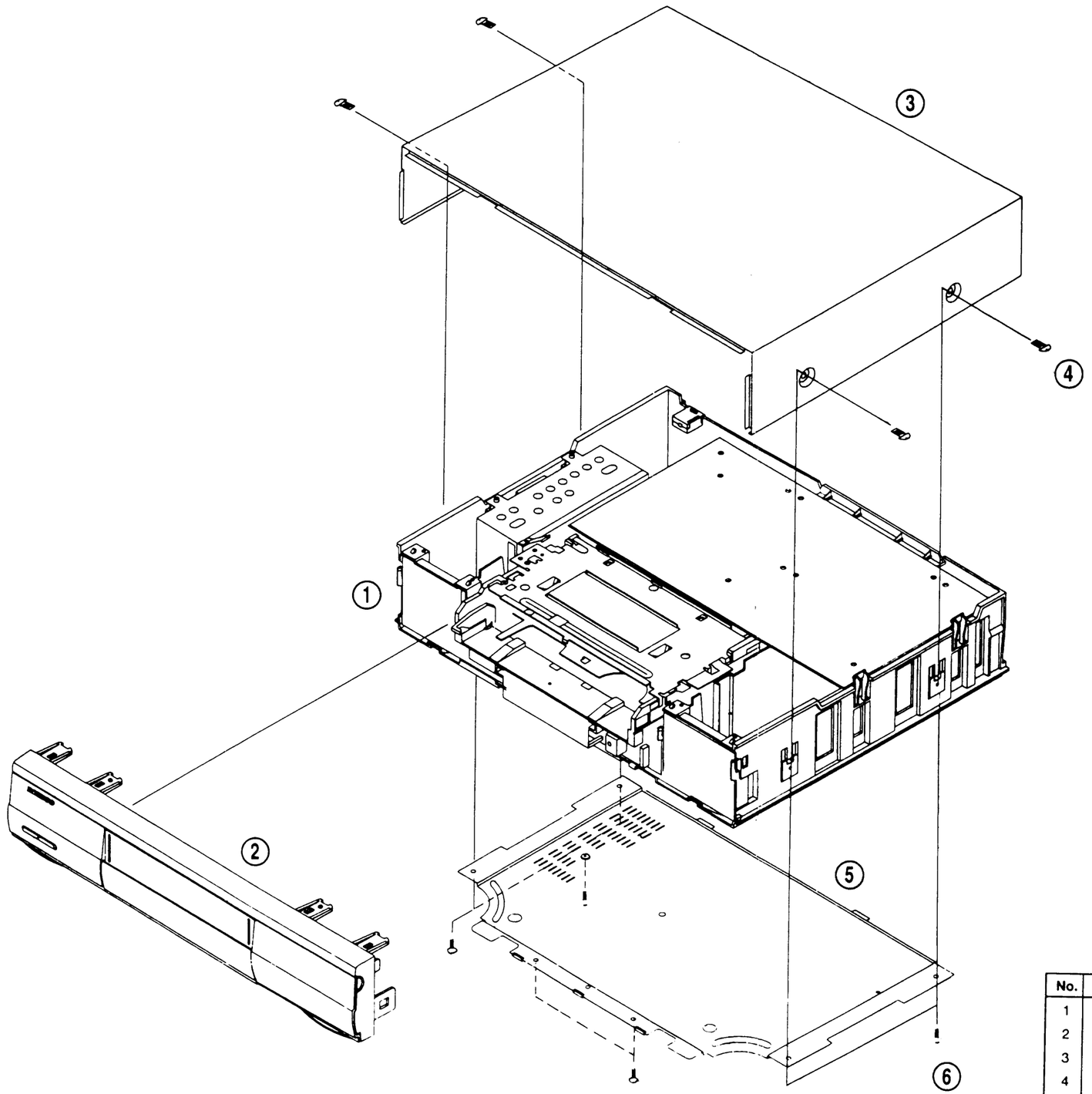
No.	Park Code	Part Name	Q'ty	Description	Remark
1	97P0310700	PANEL FRONT	1	HI-PS (HB)	
2	97P3022200	SPRING DOOR	2	SUS 304 CSP T0.2	
3	97P0802500	LEG FRONT	2	HI-PS (HB)	
4	97P0953905	PLATE FUNCTION	1	PVC T0.5	
5	97P1814700	DOOR FRONT	1	HI-PS (HB)	
6	97P0953800	PLATE DOOR	1	PVC T0.5	
7	97P4706000	FILTER DIGITRON	1	PVC T0.5	
8	97P1612400	WINDOW FRONT	1	PMMA	
9	97P1502800	BADGE DAEWOO	1	AL	
10	97P1332900	KNOB POWER/EJECT	1	ABS	
11	97P3033600	SPRING DOOR F/L	1	SWPB	
12	97P1813900	DOOR F/L	1	ABS	
13	97P1708500	INDICATOR LED	1	PS	
14	97P0954000	PLATE EARTH 1	1	SUS 304 CSP T0.15	
15	97P1332800	KNOB FUNCTION	1	ABS	
16	97P1333000	KNOB REC	1	ABS	

9-2. SET ASSEMBLY

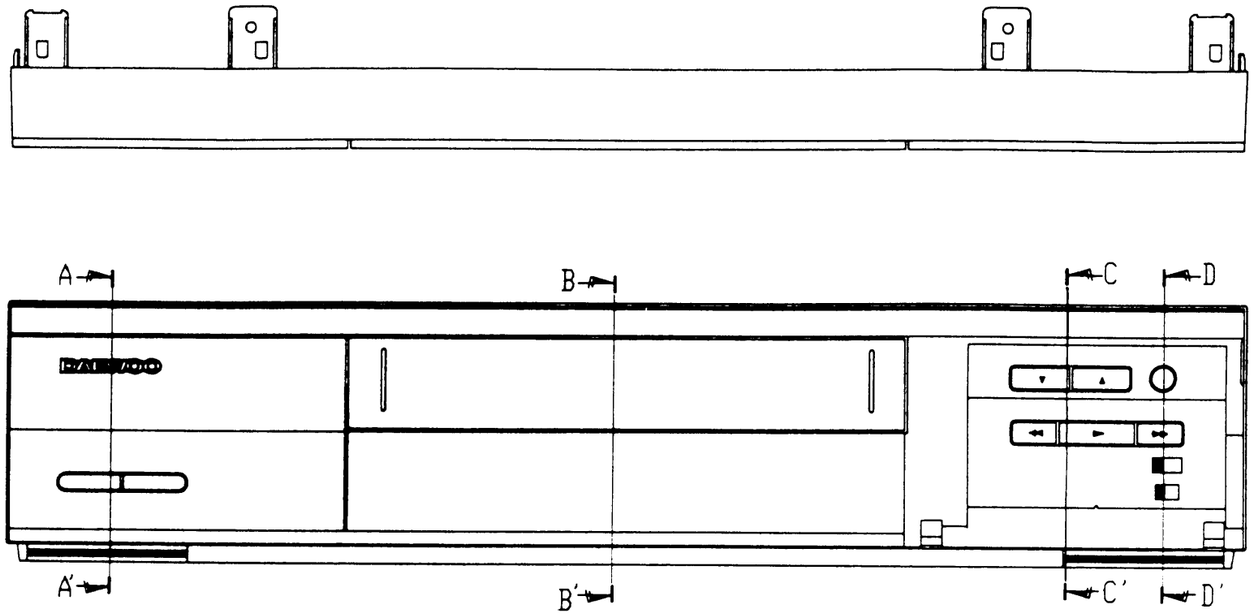


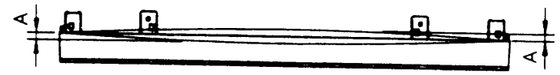
No.	Park Code	Part Name	Q'ty	Description	Remark
1	97P0607900	CHASSIS MAIN	1	HI-PS (HB)	
2	97P2422700	BRKT EARTH	4	SECC t=1.0	
3	97PC141600	DECK PRICE AS	1		
4	7124401211	SCREW TAPPING	3	T2S RND 4x12 MFZN	3 FIX
5	97P2811800	SPACER E	1	EVA	
6	97P4211600	CUSHION F/L	1	EVA	
7	97PC117100	PCB PREAMP AS	1		
8	7278300811	SCREW TAPPTITE	2	TT3 WAS 3x8 MFZN	7 FIX
9	97P0954100	PLATE SHI DRUM	1	ET t=0.4	
10	7124401211	SCREW TAPPING	1	T2S RND 4x12 MFZN	7 FIX
11	97PC149800	PCB POWER AS	1		
12	7123301211	SCREW TAPPING	2	T2S RND 4x12 MFZN	11 FIX
13	97P2316600	HOLDER POWER CORD	1	NYLON 66 BLK	
14	97P0708600	BOARD ANT	1	HI-PS (HB)	
15	97PC129600	PCB MAIN AS	1		
16	97P6919100	PLATE EARTH AB	1	SUS 304 CSP t=0.2	
17	7124401211	SCREW TAPPING	2	T2S RND 4x12 MFZN	14 FIX
18	7124401211	SCREW TAPPING	2	T2S RND 4x12 MFZN	15 FIX
19	97P2812300	SPACER PCB R	3	NBR70 PVC 30	
20	97PC129900	PCB VIDEO AS	1		
21	7124401211	SCREW TAPPING	2	T2S RND 4x12 MFZN	20 FIX
22	97PC120200	PCB TIMER 1 AS	1		
23	97P2330000	HOLDER DIGITRON	1	PP	
24	97PC130300	PCB TIMER 2 AS	1		
25	97P0800600	LEG	2	SBR 80	BLK

9-3. SET TOTAL ASSEMBLY

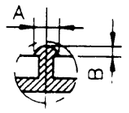


No.	Park Code	Part Name	Q'ty	Description	Remark
1	97PC157100	CHASSICS MAIN AS	1		
2	97PC122202	PANEL FRONT AS	1		
3	97P0452800	COVER TOP	1	SECC T=0.8	
4	7003400812	SCREW MACHINE	4	BIN 4x8 MFZN BK	3 FIX
5	97P0452900	COVER BOTTOM	1	SECC T+0.6	
6	7124301211	SCREW TAPPING	7	T2S RND 3x12 MFZN	5 FIX

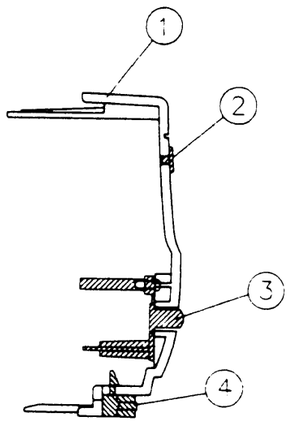




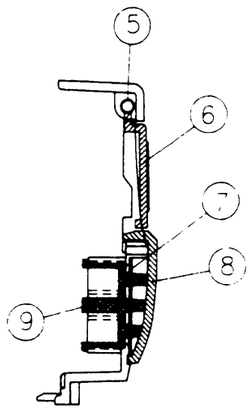
6.각 KNOB들의 STROKE는 0.5±0.3 이내일것.
7.용착부의 용착후 형상은 아래와 같을것.



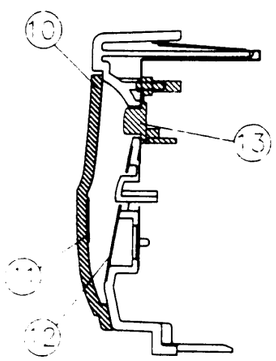
A: ø4~ø6
B: 0.7 이상



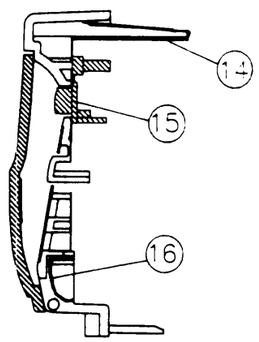
SEC A-A



SEC B-B'



SEC C-C'



SEC D-D'

No.	Park Code	Part Name	Q'ty	Description	Remark
1	97P0310700	PANEL FRONT	1	HI-PS (HB)	
2	97P1502800	BADGE DAEWOO	1	AL	
3	97P1332900	KNOB P/EJECT	1	ABS	
4	97P0802500	LEG FRONT	1	ABS	
5	97P3033600	SPRING F/L DOOR	1	SWPB	
6	97P1813900	DOOR F/L	1	ABS	
7	97P4706000	FILTER DIGITRON	1	PVC T=0.5	
8	97P1612400	WINDOW FRONT	1	PMMA	
9	97P1612400	INDICATOR LED	1	PS	
10	97P1814700	DOOR FRONT	1	HI-PS (HB)	
11	97P0953800	PLATE DOOR	1	PVC T=0.5	
12	97P0953905	PLATE FUNCTION	1	PVC T+0.5	
13	97P1333000	KNOB REC	1	ABS	
14	97P0954000	PLATE EARTH 1	1	SUS 304 CSP T0.15	
15	97P1332800	KNOB FUNCTION	1	ABS	
16	97P3022200	SPRING DOOR	2	SUS 304 CSP T0.15	